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## Description

The present invention relates to a digital modulation method which converts 8-bit digital data into 14-bit digital modulation codes.

Conventional apparatuses, which use rotary heads to record digital data to magnetic tape or to reproduce digital data recorded on magnetic tape, utilize rotary transformers to record or reproduce the digital data: recording is performed by supplying the digital data to the rotary head through the rotary transformer; and reproduction is performed by reading the digital signal with the rotary magnetic head through the rotary transformer.

Consequently, if the reproduced signal includes a DC (Direct Current) component, the digital data cannot be correctly reproduced. For this reason, the digital data must be recorded by using a DC free digital modulation system.

Among the conventional DC free digital modulation systems, the following systems are well known.

The 8-10 modulation system, the DR (Density Ratio) of which is 0.8, is described in Japanese Patent Application Laying-Open No. 56-19506.

The M<sup>2</sup> modulation system, the DR of which is 1, is known.

The 8-14 modulation system, the DR of which is 1.14, is described in Japanese Patent Application Laying-Open No. 61-196469. This system provides up to four 14-bit digital modulation codes for each 8-bit digital data. When the CDS (Code word Digital Sum) of a 14-bit modulation code is zero, the code is paired with the reversal pattern thereof. When the CDS of a 14-bit digital modulation code is not zero, the code is grouped with the following three codes: another 14-bit modulation code the absolute value and sign of CDS of which differ from those of the above code; and the reversal patterns of the respective codes.

Here, CDS is defined as a DSV calculated from the first bit to the last bit of a modulation code: DSV (Digital Sum Value) is a total sum obtained by adding -1 for respective bits "0" in a series of digital modulation codes and by adding 1 for respective bits "1" in the same codes. The reversal pattern is a pattern obtained by reversing each bit in a code: bit "1" is reversed to "0", whereas bit "0" is reversed to "1".

Another digital modulation method for converting 8-bit digital data into 14-bit digital modulation codes is described in Patent Abstracts of Japan, vol. 11, no. 237 (E-528), 4 August 1988. According to that method, the number of consecutive bits in a leading block and in an end block of bits is limited to five or less, and the number of consecutive bits in a middle block of bits is restricted to a range between 2 and 10. The code satisfies the requirement that the digital sum value (DSV) for all bits in the modulation code is equal to or below a predetermined value.

The above-mentioned conventional modulation systems have the following problems.

The 8-10 modulation system is not appropriate to a high-density recording because of its low DR of 0.8.

The M<sup>2</sup> modulation system is restricted in its high density recording because of its DR of 1.

The 8-14 modulation system has up to 4 modulation codes for each 8-bit code, and the absolute value of CDS of the digital modulation codes are allowed up to 6. In addition, DSV at the end of each 14-bit digital modulation code in the code stream is allowed up to  $\pm 4$ , and DSV at each bit in a series of the 14-bit digital modulation codes is allowed up to  $\pm 9$ . Consequently, it is difficult to eliminate the DC component of the modulation codes in a short time, and hence, low frequency component must be adequately passed in a recording/reproducing system including the rotary transformer.

A further problem is presented in the 8-14 modulation system. Generally speaking, magnetizing depth on magnetic tape is about 1/4 of the magnetized wavelength. When recording signals are over-written on the tape, the following problem occurs: recording a new signal of the shortest magnetized wavelength on the longest magnetized wavelength which is 4 times or more longer than the shortest magnetized wavelength results in the erasing residue in the deeper part of the recording medium. This erasing residue appears during reproduction of the new signal, and so the over-writing is practically difficult.

Thus, the 8-14 modulation system suffers from the problem caused by the erasing residue when over-writing is performed because the number of consecutive identical bits ("0" or "1") in a 8-14 modulation code train is 2-9.

Incidentally, in the later description, the term "consecutive identical bits" means two or more consecutive identical bits: for example, "000" or "11".

It is therefore an object of the present invention to provide a digital modulation system which can solve the above problems: the digital modulation system that allows high density recording, that can reduce the DC component with high efficiency, and that can perform azimuth recording and over-writing.

In a first aspect of the present invention, there is provided a digital modulation method for converting 8-bit digital data into 14-bit digital modulation codes, the digital modulation method comprising:

step 1 for selecting up to four 14-bit digital modulation codes for each 8-bit digital data, the 14-bit digital

modulation code is selected by the procedures of

(a) selecting among the  $2^{14}$  14-bit digital codes, a digital code the numbers of consecutive identical bits in which are 5 or less in the first 6 bits, 2 - 7 from the second bit to 13th bit, and 6 or less in the last 7 bits, the absolute value of CDS of the selected digital code being 4 or less, and repeating this selecting procedure,

(b) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is 0, and pairing the selected 14-bit digital code with the reversal code thereof to make the 2 digital codes one group, or selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "1", and the value of CDS of which is +2 or +4, combining the selected 14-bit digital codes with the reversal codes thereof, and further combining the two 14-bit digital codes with a pair of 14-bit digital codes selected at the above procedure to make the 4 digital codes one group, and repeating this selecting procedure,

(c) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is +2, and another digital code the first bit of which is "1", and the value of CDS of which is +2 or +4, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure,

(d) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is +4, and another digital code the first bit of which is "1", and the value of CDS of which is +2, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure, and

(e) selecting 256 groups among the groups formed in the above procedures as the 14-bit digital modulation codes;

step 2 for selecting one group of 14-bit digital modulation codes among the 256 groups of the 14-bit digital modulation codes, the selected group corresponding to inputted 8-bit digital data;

step 3 for further selecting one or more 14-bit digital modulation codes in the selected group at step 2, each of the 14-bit digital modulation codes satisfying the requirement that the number of consecutive identical bits at the joint portion of the preceding 14-bit digital modulation code already selected and the 14-bit digital modulation code to be selected is 2 - 7; and

step 4 for further selecting one 14-bit digital modulation code among the selected modulation codes at step 3 so that the one 14-bit digital modulation code satisfies the requirement that the absolute value of the DSV at each bit of the modulation code (called bit DSV hereinafter) is equal to or less than 7.

In a second aspect of the present invention, there is provided a digital modulation method for converting 8-bit digital data into 14-bit digital modulation codes, the digital modulation method comprising:

step 1 for selecting up to four 14-bit digital modulation codes for each 8-bit digital data, the 14-bit digital modulation code is selected by the procedures of

(a) selecting among the  $2^{14}$  14-bit digital codes, a digital code the numbers of consecutive identical bits in which are 6 or less in the first 7 bits, 2 - 7 from the second bit to 13th bit, and 5 or less in the last 6 bits, and repeating this selecting procedure,

(b) selecting among the 14-bit digital codes selected at the procedure (a), a digital code the first bit of which is "0", and the CDS of which has the absolute value equal to or less than 6, and repeating this selecting procedure,

(c) selecting among the 14-bit digital codes selected at the procedure (a), a digital code the first bit of which is "1", and the CDS of which has the absolute value equal to or less than 4, and repeating this selecting procedure,

(d) selecting among the 14-bit digital codes selected at the procedure (b), a digital code the value of CDS of which is 0, and pairing the selected 14-bit digital code with the reversal code thereof to make the 2 digital codes one group, and repeating this selecting procedure,

(e) selecting among the 14-bit digital codes selected at the procedure (b), a digital code the value of CDS of which is +2, +4 or +6, selecting among the 14-bit digital codes selected at the procedure (c), a digital code the value of CDS of which is +2 or +4, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure, and

(f) selecting 256 groups among the groups formed in the above procedures as the 14-bit digital modulation codes;

step 2 for selecting one group of 14-bit digital modulation codes among the 256 groups of the 14-bit digital modulation codes, the selected group corresponding to inputted 8-bit digital data;

step 3 for further selecting one or more 14-bit digital modulation codes in the selected group at step 2, each of the 14-bit digital modulation codes satisfying the requirement that the number of consecutive identical bits at the joint portion of the preceding 14-bit digital modulation code already selected and the 14-bit digital modulation code to be selected is 2 - 7; and

5 step 4 for further selecting one 14-bit digital modulation code among the selected modulation codes at step 3 so that the one 14-bit digital modulation code satisfies the requirement that the absolute value of the bit DSV of the modulation code is equal to or less than 8.

Fig. 1 is a block diagram showing a digital modulation apparatus for carrying out the digital modulation according to the first embodiment of the digital modulation method of the present invention;

10 Fig. 2 is a block diagram showing an embodiment of the decoding circuit;

Fig. 3A is a graph showing a carrier-to-noise ratio of a reproduced signal;

Fig. 3B is a graph showing a power spectrum of the first embodiment of the present invention;

Fig. 3C is a graph showing a power spectrum of the scrambled NRZ;

Fig. 4 is a view showing the number of 14-bit digital modulation codes whose  $CDS \geq 0$ ;

15 Fig. 5 is a view showing the number of 14-bit digital modulation codes whose  $CDS \leq 0$ ;

Fig. 6 is a block diagram showing a digital modulation apparatus for carrying out the digital modulation according to the second embodiment of the digital modulation method of the present invention;

Fig. 7 is a flowchart showing the modulation procedure of the digital modulation apparatus for carrying out the digital modulation according to the second embodiment;

20 Fig. 8 is a view showing the number of 14-bit digital modulation codes whose  $CDS \geq 0$ ; and

Fig. 9 is a view showing the number of 14-bit digital modulation codes whose  $CDS \leq 0$ .

The invention will now be described with reference to the accompanying drawings.

#### [A] FIRST EMBODIMENT

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Fig. 1 is a block diagram showing a digital modulation apparatus for carrying out the digital modulation according to the first embodiment of the digital modulation method of the present invention.

In Fig. 1, 8-bit digital data 1 is converted to a 14-bit digital modulation code by an encoder 2. An end pattern judgement portion 3 converts the end pattern of the last 6-bits of the 14-bit digital modulation code into a 4-bit code in Table 9 (although the last 8 bits of the modulation codes are given in Table 9, only the last 6 bits should be considered). A CDS calculation portion 5 computes the CDS of the 14-bit digital modulation code supplied, and converts the resultant CDS into a 3-bit code in Table 7. A DSV calculation portion 4 adds the CDS of the current 14-bit digital modulation code to the DSV at the end of the preceding 14-bit digital modulation code, yielding a new DSV, and converts the new DSV into a 2-bit code shown in Table 8.

35 A parallel-to-serial converter 8 converts the 14-bit digital modulation code into a serial signal in synchronism with a clock signal 9. A recording portion 10 records the serial modulation signal produced from the parallel-to-serial converter 8 on a recording medium such as magnetic tape or the like.

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TABLE 7

5	CDS of modulation codes	Corresponding 3-bit codes
10	-4	000
	-2	001
15	0	010
	2	011
20	4	100

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TABLE 8

30	DSV at the end of the preceding modulation codes	Corresponding 2-bit codes
35	-2	00
	0	01
40	2	10

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TABLE 9

5	End pattern of the preceding modulation code	Corresponding 2-bit codes
10	... xxxxx110	0000
15	... xxxxx1100	0001
20	... xxx11000	0010
25	... xx110000	0011
30	... x1100000	0100
35	... 11000000	0101
40	... xxxxx001	0110
45	... xxxxx0011	0111
	... xxx00111	1000
	... xx001111	1001
	... x0011111	1010
	... 00111111	1011

x: Don't care bit

The output code of the CDS calculation portion 5 is supplied to the DSV calculation portion 4.

50 The DSV calculation portion 4 supplies the code to the encoder 2 via a latch 6. The end pattern judgement portion 3 supplies the code to the encoder 2 via a latch 7.

Next, the method for selecting a 14-bit digital modulation code corresponding to each inputted 8-bit digital data will be described.

55 First, the method for selecting up to four 14-bit digital modulation codes for each 8-bit digital data will be described. The 14-bit digital modulation code is selected by the procedures of

(a) selecting among the  $2^{14}$  14-bit digital codes, a digital code the numbers of consecutive identical bits in which are 5 or less in the first 6 bits, 2 - 7 from the second bit to 13th bit, and 6 or less in the last 7 bits, the absolute value of CDS of the selected digital code being 4 or less, and repeating this selecting proce-

ture,

- (b) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is 0, and pairing the selected 14-bit digital code with the reversal code thereof to make the 2 digital codes one group, and repeating this selecting procedure, or selecting  
 5 among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "1", and the value of CDS of which is +2 or +4, combining the selected 14-bit digital codes with the reversal codes thereof, and further combining the two 14-bit digital codes with a pair of 14-bit digital codes selected at the above procedure to make the 4 digital codes one group, and repeating this selecting procedure,  
 10 (c) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is +2, and another digital code the first bit of which is "1", and the value of CDS of which is +2 or +4, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure,  
 15 (d) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is +4, and another digital code the first bit of which is "1", and the value of CDS of which is +2, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure, and  
 (e) selecting 256 groups among the groups formed in the above procedures as the 14-bit digital modulation codes.

Next, the selection procedure of a 14-bit digital modulation code (current modulation code) corresponding  
 20 to inputted 8-bit data will be described.

First, the DSV at the end of the preceding modulation code is calculated, and the end pattern of the preceding modulation code is decided as one of the twelve end patterns shown in Table 9.

Subsequently, the current 14-bit digital modulation code is selected by the encoder 2 in response to the  
 25 8-bit data, the DSV at the end of the preceding modulation code, and the end pattern of the preceding modulation code.

More specifically, the following steps are taken for selecting the current 14-bit digital modulation code.

- (1) The 14-bit digital modulation codes satisfying the following conditions are selected from Tables 4 and  
 30 5: (a) the number of consecutive identical bits at the joint portion with the preceding 14-bit digital modulation code is two to seven; and (b) the absolute value of the DSV at the end of the digital modulation code (called end DSV hereinafter) is equal to or less than two.  
 (2) When two or more 14-bit digital modulation codes are selected at step (1), the 14-bit digital modulation code that gives the least absolute value of the end DSV is chosen.  
 (3) When two or more 14-bit digital modulation codes are still chosen in step (2), the 14-bit digital modulation code is selected by calculating the bit DSV of the modulation code, determining the bit DSV the absolute value of which is minimum for each modulation code, and choosing the code including the bit DSV  
 35 whose minimum absolute value is minimum.  
 (4) When two or more 14-bit digital modulation codes are further found in step (3), the 14-bit digital modulation code is selected by finding the maximum absolute value of the bit DSV of each modulation code, and choosing the code including the bit DSV whose maximum absolute value is equal to or less than six.  
 40 (5) When two or more modulation code are still found in step (4), is selected the 14-bit digital modulation code satisfying the condition that the number of consecutive identical bits at the joint portion with the preceding 14-bit digital modulation code is equal to or less than six.  
 (6) When any modulation codes selected at step (4) does not satisfy step (5), or two or more modulation codes satisfy step (5), is selected a 14-bit digital modulation code satisfying the condition that the consecutive identical bits in that modulation code is equal to or less than six.  
 45 (7) When any modulation code selected at step (4) does not satisfy steps (5) and (6), or when any modulation code selected at step (5) does not satisfy step (6), or when two or more modulation codes are further found at step (6), the following steps are taken.  
 (7a) When the end DSV of the modulation code is -2, the code of higher priority (corresponding to smaller number in Table 10) is selected according to Table 10. Likewise, when the end DSV of the modulation code is +2, the code of higher priority is selected according to Table 11.  
 50 (7b) When two or more modulation codes belonging to the equal highest priority are found in step (7a), all of them are temporarily selected. When the end DSV is zero, is selected the modulation code satisfying the last six bits of which are not "...111111", nor "...000000" in the modulation codes.  
 55 (8) When any modulation code selected at step (4) does not satisfy steps (5), (6) and (7), or when any modulation code selected at step (5) does not satisfy step (6) and (7), or when any modulation code selected at step (6) does not satisfy step (7), or when two or more modulation codes are further found at step (7), is selected the modulation code including the bit DSV whose maximum absolute value is minimum.

(9) When two or more modulation codes are still found at step (8), is selected the modulation code including the bit DSV whose minimum absolute value appears fastest in the bit string of the modulation code.

(10) When two or more modulation codes are further found at step (9), is selected the modulation code whose bit will be reversed fastest after the joint point with the preceding modulation code.

TABLE 10

In the case where DSV at the end of modulation code is "-2"

End pattern of modulation codes	Priority
... xxxxx001	4
... xxxxx0011	1
... xxx00111	2
... xx001111	3
... x0011111	8
... xxxxx110	10
... xxxxx1100	5
... xxx11000	6
... xx110000	7
... x1100000	9
... 11000000	11

x: Don't care bit



TABLE 11

In the case where DSV at the end of modulation code is "+2"

End pattern of modulation codes	Priority
... xxxxx110	4
... xxxx1100	1
... xxx11000	2
... xx110000	3
... x1100000	8
... xxxxx001	10
... xxxx0011	5
... xxx00111	6
... xx001111	7
... x0011111	9
... 00111111	11

x: Don't care bit

The 14-bit digital modulation code thus selected is fed to the parallel-to-serial converter 8. The modulation code entered the parallel-to-serial converter 8 is serially read out in synchronism with the clock 9, and is fed to the recording portion 10, where the 14-bit digital modulation code is recorded on the recording medium such as magnetic tape or the like.

On the other hand, the 14-bit digital modulation code selected by the encoder 2 is supplied to the DSV calculation portion 4, and to the end pattern judgement portion 3. The DSV calculation portion 4 adds the CDS of the current modulation code to the DSV at the end of the preceding modulation code to obtain a new DSV. The new DSV is converted into a 2-bit code according to Table 8, and is supplied to the encoder 2 through latch 6. The end pattern judgement portion 3 converts the last 6 bits of the 14-bit modulation code into a 4-bit code according to Table 9, and supplies the 4-bit code to the encoder 2 through latch 7.

The above procedure is repeated for every 8-bit input data. Thus, a 14-bit digital modulation code train is obtained, in which the number of consecutive identical bits is restricted to 2 - 7, and the absolute value of the

DSV is restricted equal to or less than 7.

Fig. 2 shows an example of the decoding circuit. In Fig. 2, reference numeral 11 designates a reproducing portion, 12 designates a synchronizing signal detector, 13 denotes a serial-to-parallel converter, and 14 denotes a decoder. The decoding procedure by the decoding circuit will now be described.

5 The serial modulation code reproduced by the reproducing portion 11 is supplied to the synchronizing signal detector 12 and the serial-to-parallel converter 13. The synchronizing signal detector 12 detects the synchronizing signal inserted at the beginning of the synchronizing block, and supplies it to the parallel-to-serial portion 13. The synchronizing signal is used to synchronize with each 14-bit digital modulation code. The serial-to-parallel converter 13, using the synchronizing signal from the synchronizing signal detector 12, converts the serial 14-bit digital modulation code to a parallel 14-bit digital modulation code, and supplies it to the decoder 14. The decoder 14 decodes the 14-bit digital modulation code into corresponding 8-bit data by using a ROM.

Next, the 14-bit digital modulation code produced from the encoder 2 in Fig. 1 will be described.

The 14-bit digital modulation code converted from the 8-bit code satisfies the following requirements.

- 15 (1) The number of consecutive identical bits in the first 6 bits is equal to or less than 5.  
 (2) The number of consecutive identical bits included from the second bit to the 13th bit is 2 - 7.  
 (3) The number of consecutive identical bits included in the last 7 bits is equal to or less than 6.  
 (4) The absolute value of CDS of the modulation code is equal to or less than 4.

20 The end patterns of the modulation codes that satisfy the above requirements (1) to (4) are summed up as the following 12 items (A) - (M).

	(A)	... ..	110
25	(B)	... ..	1100
	(C)	... ..	11000
	(D)	... ..	110000
	(E)	... ..	1100000
30	(F)	... ..	11000000
	(G)	... ..	001
	(H)	... ..	0011
35	(J)	... ..	00111
	(K)	... ..	001111
	(L)	... ..	0011111
40	(M)	... ..	00111111

The beginning of the modulation code succeeding to the modulation codes (A) - (M) is one of the following items.

45 First, the beginning of the modulation code succeeding to the modulation code (A) is one of the following five items (A1) - (A5).

	(A1)	011 ... ..
50	(A2)	0011... ..
	(A3)	00011 ... ..
	(A4)	000011 ... ..
55	(A5)	0000011 ... ..

Second, the beginning of the modulation code succeeding to the modulation code (B) is one of the following nine items (B1) - (B9).

5 (B1) 011 ... ..  
 (B2) 0011... ..  
 (B3) 00011 ... ..  
 (B4) 000011 ... ..  
 (B5) 0000011 ... ..  
 10 (B6) 1100... ..  
 (B7) 11100 ... ..  
 (B8) 111100 ... ..  
 (B9) 1111100 ... ..

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The beginning of the modulation code succeeding to the modulation code (C) is one of the following eight items (C1) - (C8) .

20 (C1) 011 ... ..  
 (C2) 0011... ..  
 (C3) 00011 ... ..  
 25 (C4) 000011 ... ..  
 (C5) 1100... ..  
 (C6) 11100 ... ..  
 (C7) 111100 ... ..  
 30 (C8) 1111100 ... ..

The beginning of the modulation code succeeding to the modulation code (D) is one of the following seven items (D1) - (D7).

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(D1) 011 ... ..  
 (D2) 0011... ..  
 40 (D3) 00011 ... ..  
  
 (D4) 1100... ..  
 45 (D5) 11100 ... ..  
 (D6) 111100 ... ..  
 (D7) 1111100 ... ..

50 The beginning of the modulation code succeeding to the modulation code (E) is one of the following six items (E1) - (E6).

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5 (E1) 011 ... ..  
 (E2) 0011... ..  
 (E3) 1100... ..  
 (E4) 11100 ... ..  
 (E5) 111100 ... ..  
 10 (E6) 1111100 ... ..

The beginning of the modulation code succeeding to the modulation code (F) is one of the following five items (F1) - (F5).

15 (F1) 011 ... ..  
 (F2) 1100... ..  
 (F3) 11100 ... ..  
 20 (F4) 111100 ... ..  
 (F5) 1111100 ... ..

25 The beginning of the modulation code succeeding to the modulation code (G) is one of the reversal patterns of the modulation codes (A1) - (A5).

The beginning of the modulation code succeeding to the modulation code (H) is one of the reversal patterns of the modulation codes (B1) - (B9).

The beginning of the modulation code succeeding to the modulation code (J) is one of the reversal patterns of the modulation codes (C1) - (C8).

30 The beginning of the modulation code succeeding to the modulation code (K) is one of the reversal patterns of the modulation codes (D1) - (D7).

The beginning of the modulation code succeeding to the modulation code (L) is one of the reversal patterns of the modulation codes (E1) - (E6).

35 The beginning of the modulation code succeeding to the modulation code (M) is one of the reversal patterns of the modulation codes (F1) - (F5).

The numbers of the modulation codes that satisfy the requirements (1) - (4) are shown in Tables 1 and 2. The code "1000000011111" (CDS = 0), and the code "01111111000000" (CDS = 0) are excluded from the numbers.

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TABLE 1

Beginning pattern of modulation codes	The number of possible modulation codes							
	CDS Value							
	-4	-2	0	2	4	Total	CDS $\leq 0$	CDS $\geq 0$
0000011.....	9	8	6	0	0	23	23	6
000011.....	12	14	10	6	0	42	36	16
00011.....	15	21	20	11	5	72	56	36
0011.....	17	29	33	26	11	116	79	70
011.....	17	37	49	47	32	182	103	128
Total	70	109	118	90	48	435	297	256

TABLE 2

Beginning pattern of modulation codes	The number of possible modulation codes							
	CDS Value							
	-4	-2	0	2	4	Total	CDS $\leq 0$	CDS $\geq 0$
1111100.....	0	0	6	8	9	23	6	23
111100.....	0	6	10	14	12	42	16	36
11100.....	5	11	20	21	15	72	36	56
1100.....	11	26	33	29	17	116	70	79
100.....	32	47	49	37	17	182	128	103
Total	48	90	118	109	70	435	256	297

More than 256 modulation codes whose  $CDS \geq 0$ , and more than 256 modulation codes whose  $CDS \leq 0$  are necessary, which follow one of the modulation codes (A) - (M). In addition, the converted modulation code must correspond to one 8-bit data to avoid transmission error.

The number of modulation codes that can succeed one of the modulation codes (A) - (M) is shown in Table 3.

For example, the CDS of the modulation codes that terminate with "...00111111" is "2" or "4". Accordingly, the end DSV of the modulation code takes a value of "0" or "2", and so the succeeding modulation code must satisfy the requirements that its  $CDS \leq 0$ , and it must begin with any one of the bit train "0000011", "000011", "00011", "0011", and "100". The number of the modulation codes that satisfy the requirements are 322 as shown in Table 3, which is greater than the necessary number of 256.

Likewise, the CDS of the modulation codes that terminate with "...11000000" is "-2" or "-4". Accordingly, the end DSV of the modulation code takes a value of "0" or "-2", and so the succeeding modulation code must satisfy the requirements that its  $CDS \geq 0$ , and it must begin with any one of the bit train "1111100", "111100", "11100", "1100", and "011". The number of the modulation codes that satisfy the requirements are 322 as shown in Table 3, which is greater than the necessary number of 256.

TABLE 3

End pattern of modulation codes	The number of possible successive modulation codes							
	CDS Value						CDS $\leq 0$	CDS $\geq 0$
	-4	-2	0	2	4	Total		
.....110	70	109	118	90	48	435	297	256
.....1100	86	152	187	162	101	688	425	450
.....11000	77	144	181	162	101	665	402	444
....110000	65	130	171	156	101	623	366	428
...1100000	50	109	151	145	96	551	310	392
..11000000	33	80	118	119	85	435	231	322
.....001	48	90	118	109	70	435	256	297
.....0011	101	162	187	152	86	688	450	425
.....00111	101	162	181	144	77	665	444	402
.....001111	101	156	171	130	65	623	428	366
....0011111	96	145	156	109	50	550	392	310
...00111111	85	119	118	80	33	435	322	231

Fig. 4 shows the number of modulation codes of respective classes when  $CDS \geq 0$ , and Fig. 5 shows the number of modulation code of respective classes when  $CDS \leq 0$ .

Tables 4 and 5 show the correspondence between the 8-bit data and the modulation codes: Table 4 shows the correspondence when  $CDS \geq 0$ ; and Table 5 shows the correspondence when  $CDS \leq 0$ .

Table 4 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	0	01111110000001	0		0	10000001111110	0
	1	011111100110000	0		1	10000011001111	0
	2	011111100011000	0		2	10000011100111	0
	3	011111100001100	0		3	10000011110011	0
	4	011111100000110	0		4	10000011111001	0
	5	011111100000011	0		5	10000011111100	0
10	6	011111001110000	0		6	10000110001111	0
	7	011111001100001	0		7	10000110011110	0
	8	011111000111000	0		8	10000111000111	0
	9	011111000110001	0		9	10000111001110	0
	10	011111000011100	0		10	10000111100011	0
	11	011111000011001	0		11	10000111100110	0
15	12	011111000001110	0		12	10000111110001	0
	13	011111000000111	0		13	10000111110000	0
	14	011100111110000	0		14	10001100001111	0
	15	011100111100001	0		15	10001100011110	0
	16	011100110011100	0		16	10001100110011	0
	17	011100110001110	0		17	10001100111001	0
20	18	011100110000111	0		18	10001100111100	0
	19	011100011111000	0		19	10001110000111	0
	20	01110001110001	0		20	10001110001110	0
	21	011100011001110	0		21	10001110011001	0
	22	011100011000111	0		22	10001110011100	0
	23	011100001111100	0		23	10001111000011	0
25	24	01110000111001	0		24	10001111000110	0
	25	01110000110011	0		25	10001111001100	0
	26	011100000111110	0		26	10001111100001	0
	27	011100000011111	0		27	10001111110000	0
	28	011001111110000	0		28	10011000001111	0
	29	011001111100001	0		29	10011000011110	0
	30	011001110011100	0		30	10011000110011	0
30	31	011001110001110	0		31	10011000111001	0
	32	011001110000111	0		32	10011000111100	0
	33	011001100111100	0		33	10011001100011	0
1(A)	34	01100110011001	0	1(B)	34	10011001100110	0
	35	011001100011110	0		35	10011001110001	0
	36	011001100001111	0		36	10011001111000	0
35	37	011000111110000	0		37	10011100000111	0
	38	011000111100001	0		38	10011100001110	0
	39	011000111001110	0		39	10011100011001	0
	40	011000111000111	0		40	10011100011100	0
	41	011000110011110	0		41	10011100110001	0
	42	011000110001111	0		42	10011100111000	0
40	43	011000011111100	0		43	10011110000011	0
	44	01100001111001	0		44	10011110000110	0
	45	01100001110011	0		45	10011110001100	0
	46	01100001100111	0		46	10011110011000	0
	47	011000001111110	0		47	10011111000001	0
	48	011000000111111	0		48	10011111100000	0
45	49	011111110011100	4		49	10000011111110	2
	50	011111110001110	4		50	10000110011111	2
	51	011111110000111	4		51	10000111001111	2
	52	011111110011100	4		52	10000111100111	2
	53	011111110011001	4		53	10000111110011	2
	54	011111110001110	4		54	10000111111001	2
	55	011111110000111	4		55	10000111111100	2
50	56	011111100111100	4		56	10001100011111	2
	57	011111100111001	4		57	10001100111110	2
	58	011111100110011	4		58	10001110001111	2
	59	011111100011110	4		59	10001110011110	2
	60	011111100001111	4		60	10001111000111	2
55	61	011111001111100	4		61	10001111001110	2
	62	011111001111001	4		62	10001111100011	2
	63	011111001110011	4		63	10001111100110	2



Table 4 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	64	01111001100111	4		64	10001111110001	2
	65	01111000111110	4		65	10001111111000	2
	66	01111000011111	4		66	10011000011111	2
	67	01110011111100	4		67	10011000111110	2
	68	01110011111001	4		68	10011001100111	2
10	69	01110011110011	4		69	10011001110011	2
	70	01110011100111	4		70	10011001111001	2
	71	01110011001111	4		71	10011001111100	2
	72	01110001111110	4		72	10011100001111	2
	73	01110000111111	4		73	10011100011110	2
	74	01100111111100	4		74	10011100110011	2
15	75	01100111111001	4		75	10011100111001	2
	76	01100111110011	4		76	10011100111100	2
	77	01100111100111	4		77	10011110000111	2
	78	01100111001111	4		78	10011110001110	2
	79	01100110011111	4	1(B)	79	10011110011001	2
	80	01100011111110	4		80	10011110011100	2
	81	01111111000001	2		81	10011111000011	2
20	82	01111110011000	2		82	10011111000110	2
	83	01111110001100	2		83	10011111001100	2
	84	01111110000110	2		84	10011111100001	2
	85	01111110000011	2		85	10011111110000	2
	86	01111100111000	2		86	10001111001111	4
	87	01111100110001	2		87	10001111100111	4
25	88	01111100011100	2		88	10001111110011	4
	89	01111100011001	2		89	10011001111110	4
	90	01111100001110	2		90	10011100111110	4
	91	01111100000111	2		91	10011110001111	4
	92	01111001111000	2		92	10011110011110	4
	93	01111001110001	2		93	10011111000111	4
30	94	01111001100110	2		94	10011111001110	4
	95	01111001100011	2		95	10011111100011	4
	96	01111000111100	2		96	10011111100110	4
	97	01111000110011	2		97	110001111100111	4
1(A)	98	01111000110011	2		98	11000111110011	4
	99	01111000011110	2		99	11000000111111	2
35	100	01111000001111	2		100	11000001111110	2
	101	01110011111000	2		101	11000011001111	2
	102	01110011110001	2		102	11000011100111	2
	103	01110011100110	2		103	11000011110011	2
	104	01110011100011	2		104	11000011111001	2
	105	01110011001110	2		105	11000011111100	2
	106	01110011000111	2		106	11000110001111	2
40	107	01110001111100	2		107	11000110011110	2
	108	01110001110011	2	2(B)	108	11000111000111	2
	109	01110001110011	2		109	11000111001110	2
	110	01110001100111	2		110	11000111100011	2
	111	01110000111110	2		111	11000111100110	2
	112	01110000011111	2		112	11000111110001	2
45	113	01100111111000	2		113	11000111111000	2
	114	01100111110001	2		114	11001100001111	2
	115	01100111100110	2		115	11001100011110	2
	116	01100111100011	2		116	11001100110011	2
	117	01100111001110	2		117	11001100111001	2
	118	01100111000111	2		118	11001100111100	2
50	119	01100110011110	2		119	11001110000111	2
	120	01100110001111	2		120	11001110001110	2
	121	01100011111100	2		121	11001110011001	2
	122	01100011111001	2		122	11001110011100	2
	123	01100011110011	2		123	11001111000011	2
	124	01100011100111	2		124	11001111000110	2
55	125	01100011001111	2		125	11001111001100	2
	126	01100001111110	2		126	11001111100001	2
	127	01100000111111	2		127	11001111110000	2

Table 4 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	128	00111111100000	0		128	11000000011111	0
	129	00111111000001	0		129	11000000111110	0
	130	001111110011000	0		130	11000001100111	0
	131	001111110001100	0		131	11000001110011	0
	132	001111110000110	0		132	11000001111001	0
10	133	001111110000011	0		133	11000001111100	0
	134	001111100111000	0		134	11000011000111	0
	135	001111100110001	0		135	11000011001110	0
	136	001111100011100	0		136	11000011100011	0
	137	001111100011001	0		137	11000011100110	0
	138	001111100001110	0		138	11000011110001	0
15	139	001111100000111	0		139	11000011111000	0
	140	00111001111000	0		140	11000110000111	0
	141	00111001110001	0		141	11000110001110	0
	142	00111001100110	0		142	11000110011001	0
	143	00111001100011	0	2(B)	143	11000110011100	0
	144	00111000111100	0		144	11000111000011	0
	145	00111000111001	0		145	11000111000110	0
20	146	00111000110011	0		146	11000111001100	0
	147	00111000011110	0		147	11000111100001	0
	148	00111000001111	0		148	11000111110000	0
	149	00110011111000	0		149	11001100000111	0
	150	00110011110001	0		150	11001100001110	0
	151	00110011100110	0		151	11001100011001	0
25	152	00110011100011	0		152	11001100011100	0
	153	00110011001110	0		153	11001100110001	0
	154	00110011000111	0		154	11001100111000	0
	155	00110001111100	0		155	11001110000011	0
	156	00110001111001	0		156	11001110000110	0
	157	00110001110011	0		157	11001110001100	0
	158	00110001100111	0		158	11001110011000	0
30	159	00110000111110	0		159	11001111000001	0
	160	00110000011111	0		160	11001111100000	0
	161	00111111100001	2		161	11001100111110	4
	162	00111111001100	2		162	11001110011110	4
	163	00111111000110	2		163	11001111000111	4
	164	00111111000011	2		164	11001111001110	4
35	165	00111110011100	2		165	11001111100011	4
	166	00111110011001	2		166	11001111100110	4
	167	00111110001110	2		167	11100001111110	4
	168	00111110000111	2		168	11100011100111	4
	169	001111100111100	2		169	11100011110011	4
	170	001111100111001	2		170	11100011111100	4
40	171	001111100110011	2		171	11100110011110	4
	172	001111100011110	2	3(B)	172	11100111000111	4
	173	001111100001111	2		173	11100111001110	4
	174	00111001111100	2		174	11100111100011	4
	175	00111001111001	2		175	11100111100110	4
	176	00111001110011	2		176	11100111110000	4
	177	00111001100111	2		177	11100000011111	2
45	178	00111000111110	2		178	11100000111110	2
	179	00111000011111	2		179	11100001100111	2
	180	00110011111100	2		180	11100001110011	2
	181	00110011111001	2		181	11100001111001	2
	182	00110011110011	2		182	11100001111100	2
	183	00110011100111	2		183	11100011000111	2
50	184	00110011001111	2		184	11100011001110	2
	185	00110001111110	2		185	11100011100011	2
	186	00110000111111	2		186	11100011100110	2
	187	00111111100110	4		187	11100011110001	2
	188	00111111100011	4		188	11100011111000	2
	189	00111111001110	4		189	11100110000111	2
55	190	00111111000111	4		190	11100110001110	2
	191	00111110011110	4		191	11100110011001	2

Table 4 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	192	00111110001111	4		192	11100110011100	2
	193	00111100111110	4		193	11100111000011	2
	194	00111100011111	4		194	11100111000110	2
	195	00111001111110	4		195	11100111001100	2
	196	00111000111111	4		196	11100111100001	2
	197	00110011111110	4		197	11100111110000	2
10	198	00011111110000	0	3(B)	198	11100000001111	0
	199	00011111100001	0		199	11100000011110	0
	200	000111111001100	0		200	11100000110011	0
	201	000111111000110	0		201	11100000111001	0
	202	000111111000011	0		202	11100000111100	0
	203	000111100111100	0		203	11100001100011	0
15	204	00011110011001	0		204	11100001100110	0
	205	000111100011110	0		205	11100001110001	0
	206	000111100001111	0		206	11100001111000	0
	207	000111001111100	0		207	11100011000011	0
	208	00011100111001	0		208	11100011000110	0
	209	00011100110011	0		209	11100011001100	0
20	210	000111000111110	0	3(A)	210	11100011100001	0
	211	000111000011111	0		211	11100011110000	0
	212	000110011111100	0		212	11100110000011	0
	213	00011001111001	0		213	11100110000110	0
	214	00011001110011	0		214	11100110001100	0
	215	00011001100111	0		215	11100110011000	0
25	216	000110001111110	0		216	11100111000001	0
	217	000110000111111	0		217	11100111100000	0
	218	00011111110001	2	4(B)	218	11110001111100	4
	219	00011111100110	2		219	11110011111000	4
	220	00011111100011	2		220	11110000001111	2
	221	000111111001110	2		221	11110000011110	2
30	222	000111111000111	2		222	11110000110011	2
	223	000111100111110	2		223	11110000111001	2
	224	000111100011111	2		224	11110000111100	2
	225	000111001111110	2		225	11110001100011	2
	226	000111000111111	2		226	11110001100110	2
	227	000110011111110	2		227	11110001110001	2
35	228	000110001111111	2		228	11110001111000	2
	229	00011111110011	4		229	11110011000011	2
	230	00011111100111	4		230	11110011000110	2
	231	00011111001111	4		231	11110011001100	2
	232	00011110011111	4		232	11110011100001	2
	233	00011100111111	4		233	11110011110000	2
40	234	00001111111000	0	4(A)	234	11110000000111	0
	235	00001111111001	0		235	11110000001110	0
	236	00001111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	00001111001110	0		238	11110000110001	0
	239	00001111000111	0		239	11110000111000	0
45	240	00001110011110	0		240	11110001100001	0
	241	00001110001111	0		241	11110001110000	0
	242	00001100111110	0		242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00001111111001	2	5(B)	244	11111000000111	2
	245	00001111110011	2		245	11111000001110	2
50	246	00001111100111	2		246	11111000011001	2
	247	00001111001111	2		247	11111000011100	2
	248	00001110011111	2		248	11111000111000	2
	249	00001100111111	2		249	11111001110000	2
55	250	00000111111100	0		250	11111000000011	0
	251	00000111111001	0		251	11111000000110	0
	252	00000111110011	0		252	11111000001100	0
	253	00000111100111	0		253	11111000011000	0
	254	00000111001111	0		254	11111000110000	0
	255	00000110011111	0		255	11111001100000	0

Table 5 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	0	01111110000001	0		0	10000001111110	0
	1	01111100110000	0		1	10000011001111	0
	2	01111100011000	0		2	10000011100111	0
	3	01111100001100	0		3	10000011110011	0
	4	01111100000110	0		4	10000011111001	0
	5	01111100000011	0		5	10000011111100	0
10	6	01111001110000	0		6	10000110001111	0
	7	01111001100001	0		7	10000110011110	0
	8	01111000111000	0		8	10000111000111	0
	9	01111000110001	0		9	10000111001110	0
	10	01111000011100	0		10	10000111100011	0
	11	01111000011001	0		11	10000111100110	0
15	12	01111000001110	0		12	10000111100011	0
	13	01111000000111	0		13	10000111110000	0
	14	01110011110000	0		14	10001100001111	0
	15	01110011100001	0		15	10001100011110	0
	16	01110011001100	0		16	10001100110011	0
	17	01110011000110	0		17	10001100111001	0
20	18	01110011000011	0		18	10001100111100	0
	19	01110001111000	0		19	10001110000111	0
	20	01110001110001	0		20	10001110001110	0
	21	01110001100110	0		21	10001110011001	0
	22	01110001100011	0		22	10001110011100	0
	23	01110000111100	0		23	10001111000011	0
	24	01110000111001	0		24	10001111000110	0
25	25	01110000110011	0		25	10001111001100	0
	26	01110000011110	0		26	10001111100001	0
	27	01110000001111	0		27	10001111110000	0
	28	01100111110000	0		28	10011000001111	0
	29	01100111100001	0		29	10011000011110	0
	30	01100111001100	0		30	10011000110011	0
30	31	01100111000110	0		31	10011000111001	0
	32	01100111000011	0		32	10011000111100	0
	33	01100110011100	0		33	10011001100011	0
	34	01100110011001	0	1(D)	34	10011001100110	0
	35	01100110001110	0		35	10011001110001	0
	36	01100110000111	0		36	10011001111000	0
35	37	01100011111000	0		37	10011100000111	0
	38	01100011110001	0		38	10011100001110	0
	39	01100011100110	0		39	10011100011001	0
	40	01100011100011	0		40	10011100011100	0
	41	01100011001110	0		41	10011100110001	0
	42	01100011000111	0		42	10011100111000	0
40	43	01100001111100	0		43	10011110000011	0
	44	01100001111001	0		44	10011110000110	0
	45	01100001110011	0		45	10011110001100	0
	46	01100001100111	0		46	10011110011000	0
	47	01100000111110	0		47	10011111000001	0
	48	01100000011111	0		48	10011111100000	0
	49	01111100000001	-2		49	10000000110011	-4
45	50	01111001100000	-2		50	10000000111001	-4
	51	01111000110000	-2		51	10000000111100	-4
	52	01111000011000	-2		52	10000001100011	-4
	53	01111000001100	-2		53	10000001100110	-4
	54	01111000000110	-2		54	10000001110001	-4
	55	01111000000011	-2		55	10000001111000	-4
50	56	01110011100000	-2		56	10000011000011	-4
	57	01110011000001	-2		57	10000011000110	-4
	58	01110001110000	-2		58	10000011001100	-4
	59	01110001100001	-2		59	10000011100001	-4
	60	01110000111000	-2		60	10000011110000	-4
	61	01110000110001	-2		61	10000110000011	-4
55	62	01110000011100	-2		62	10000110000110	-4
	63	01110000011001	-2		63	10000110001100	-4

Table 5 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	64	01110000001110	-2		64	10000110011000	-4
	65	01110000000011	-2		65	10000111000001	-4
	66	01100111100000	-2		66	10000111100000	-4
	67	01100111000001	-2		67	10001100000011	-4
	68	01100110011000	-2		68	10001100000110	-4
	69	01100110001100	-2		69	10001100001100	-4
10	70	01100110000110	-2		70	10001100011000	-4
	71	01100110000011	-2		71	10001100110000	-4
	72	01100011110000	-2		72	10001110000001	-4
	73	01100011100001	-2		73	10001111000000	-4
	74	01100011001100	-2		74	10011000000011	-4
	75	01100011000110	-2		75	10011000000110	-4
15	76	01100011000011	-2		76	10011000001100	-4
	77	01100001111000	-2		77	10011000011000	-4
	78	01100001110001	-2		78	10011000110000	-4
	79	01100001100110	-2		79	10011001100000	-4
	80	01100001100011	-2		80	10011100000001	-4
	81	01100000111100	-2		81	10000000111110	-2
20	82	01100000111001	-2		82	10000001100111	-2
	83	01100000110011	-2		83	10000001110011	-2
	84	01100000011110	-2		84	10000001111001	-2
	85	01100000001111	-2		85	10000001111100	-2
	86	01110000110000	-4		86	10000011000111	-2
	87	01110000011000	-4		87	10000011001110	-2
	88	01110000001100	-4		88	10000011100011	-2
25	89	01100110000001	-4		89	10000011100110	-2
	90	01100011000001	-4		90	10000011110001	-2
	91	01100001110000	-4		91	10000011111000	-2
	92	01100001100001	-4		92	10000110000111	-2
	93	01100000111000	-4		93	10000110001110	-2
	94	01100000110001	-4		94	10000110011001	-2
30	95	01100000011100	-4		95	10000110011100	-2
	96	01100000011001	-4		96	10000111000011	-2
	97	00111000011000	-4	1(D)	97	10000111000110	-2
	98	00111000001100	-4		98	10000111001100	-2
	99	00111111000000	-2		99	10000111100001	-2
	100	00111110000001	-2		100	10000111110000	-2
35	101	00111110011000	-2		101	10001100000111	-2
	102	00111110001100	-2		102	10001100001110	-2
	103	00111110000110	-2		103	10001100011001	-2
	104	00111110000011	-2		104	10001100011100	-2
	105	00111110000011	-2		105	10001100110001	-2
	106	00111001110000	-2		106	10001100111000	-2
	107	00111001100001	-2		107	10001110000011	-2
40	108	00111000111000	-2		108	10001110000110	-2
	109	00111000110001	-2		109	10001110001100	-2
	110	00111000011100	-2		110	10001110011000	-2
	111	00111000011001	-2		111	10001111000001	-2
	112	00111000001110	-2		112	10001111100000	-2
	113	00111000000111	-2		113	10011000000111	-2
45	114	00110011110000	-2		114	10011000001110	-2
	115	00110011100001	-2		115	10011000011001	-2
	116	00110011001100	-2		116	10011000011100	-2
	117	00110011000110	-2		117	10011000110001	-2
	118	00110011000011	-2		118	10011000111000	-2
	119	00110001111000	-2		119	10011001100001	-2
50	120	00110001110001	-2		120	10011001110000	-2
	121	00110001100110	-2		121	10011100000011	-2
	122	00110001100011	-2		122	10011100000110	-2
	123	00110000111100	-2		123	10011100001100	-2
	124	00110000111001	-2		124	10011100011000	-2
	125	00110000110011	-2		125	10011100110000	-2
55	126	00110000011110	-2		126	10011110000001	-2
	127	00110000001111	-2		127	10011111000000	-2

Table 5 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	128	0011111100000	0		128	11000000011111	0
	129	00111111000001	0		129	11000000011110	0
	130	00111110001000	0		130	11000000110011	0
	131	00111110001100	0		131	11000000110010	0
	132	00111110000110	0		132	11000000111001	0
	133	00111110000011	0		133	11000000111100	0
10	134	00111100111000	0		134	11000011000111	0
	135	00111100110001	0		135	11000011001110	0
	136	00111100011100	0		136	11000011100011	0
	137	00111100011001	0		137	11000011100110	0
	138	00111100001110	0		138	11000011110001	0
	139	00111100000111	0		139	11000011111000	0
15	140	00111001111000	0		140	11000110000111	0
	141	00111001110001	0		141	11000110001110	0
	142	00111001100110	0		142	11000110011001	0
	143	00111001100011	0		143	11000110011100	0
	144	00111000111100	0		144	11000111000011	0
	145	00111000111001	0		145	11000111000110	0
	146	00111000110011	0		146	11000111001100	0
20	147	00111000011110	0		147	11000111100001	0
	148	00111000001111	0		148	11000111110000	0
	149	00110011111000	0		149	11001100000111	0
	150	00110011110001	0		150	11001100001110	0
	151	00110011100110	0		151	11001100011001	0
	152	00110011100011	0		152	11001100011100	0
25	153	00110011001110	0		153	11001100110001	0
	154	00110011000111	0		154	11001100111000	0
	155	00110001111100	0		155	11001110000011	0
	156	00110001111001	0		156	11001110000110	0
	157	00110001110011	0		157	11001110001100	0
	158	00110001100111	0		158	11001110011000	0
	159	00110000111110	0		159	11001111000001	0
30	160	00110000011111	0		160	11001111100000	0
	161	00110011000001	-4	2(D)	161	11000000011110	-2
	162	00110001100001	-4		162	11000000110011	-2
	163	00110000111000	-4		163	11000000111001	-2
	164	00110000110001	-4		164	11000000111100	-2
	165	00110000011100	-4		165	11000000110011	-2
35	166	00110000011001	-4		166	11000000110010	-2
	167	00011110000001	-4		167	110000001110001	-2
	168	00011100011000	-4		168	110000001111000	-2
	169	00011100001100	-4		169	11000011000011	-2
	170	00011100000011	-4		170	11000011000110	-2
	171	00011001100001	-4		171	11000011001100	-2
40	172	00011000111000	-4		172	11000011100001	-2
	173	00011000110001	-4		173	11000011110000	-2
	174	00011000011100	-4		174	11000110000011	-2
	175	00011000011001	-4		175	11000110000110	-2
	176	00011000000111	-4		176	11000110001100	-2
	177	00011111000001	-2		177	11000110011000	-2
	178	00011110000001	-2		178	11000111000001	-2
45	179	00011110011000	-2		179	11000111100000	-2
	180	00011110001100	-2		180	11001100000011	-2
	181	00011110000110	-2		181	11001100000110	-2
	182	00011110000011	-2		182	11001100001100	-2
	183	00011100111000	-2		183	11001100011000	-2
	184	00011100110001	-2		184	11001100110000	-2
50	185	00011100011100	-2		185	11001110000001	-2
	186	00011100011001	-2		186	11001111000000	-2
	187	00011100001110	-2		187	11000000011001	-4
	188	00011100000111	-2		188	11000000011100	-4
	189	00011001111000	-2		189	11000000110001	-4
	190	00011001100011	-2		190	11000000111000	-4
55	191	00011001100110	-2		191	110000001100001	-4

Table 5 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	192	00011001100011	-2	2(D)	192	11000001110000	-4
	193	00011000111100	-2		193	11000011000001	-4
	194	00011000111001	-2		194	11000011100000	-4
	195	00011000110011	-2		195	11000110000001	-4
	196	00011000011110	-2		196	11000111000000	-4
	197	00011000001111	-2		197	11001100000001	-4
	198	00011111110000	0		198	11100000001111	0
	199	00011111100001	0		199	11100000011110	0
	200	00011111001100	0		200	11100000110011	0
	201	00011111000110	0		201	11100000111001	0
10	202	00011111000011	0	3(D)	202	11100000111100	0
	203	00011111001100	0		203	11100001100011	0
	204	000111110011001	0		204	11100001100110	0
	205	00011111000110	0		205	11100001110001	0
	206	00011111000011	0		206	11100001111000	0
	207	00011100111100	0		207	11100011000011	0
	208	00011100111001	0		208	11100011000110	0
	209	00011100110011	0		209	11100011001100	0
	210	00011100011110	0		210	11100011100001	0
	211	00011100001111	0		211	11100011110000	0
15	212	00011001111100	0	4(D)	212	11100110000011	0
	213	00011001111001	0		213	11100110000110	0
	214	00011001110011	0		214	11100110001100	0
	215	00011001100111	0		215	11100110011000	0
	216	00011000111110	0		216	11100111000001	0
	217	00011000011111	0		217	11100111100000	0
	218	00001110000011	-4		218	11100000001110	-2
	219	00001100000011	-4		219	11100000011001	-2
	220	00001111110000	-2		220	11100000011100	-2
	221	00001111100001	-2		221	11100000110001	-2
20	222	00001111001100	-2	5(D)	222	11100000111000	-2
	223	00001111000110	-2		223	11100001100001	-2
	224	00001111000011	-2		224	11100001110000	-2
	225	00001110011100	-2		225	11100011000001	-2
	226	00001110011001	-2		226	11100011100000	-2
	227	00001110001110	-2		227	11100110000001	-2
	228	00001110000111	-2		228	11100111000000	-2
	229	00001100111100	-2		229	11100000001100	-4
	230	00001100111001	-2		230	11100000011000	-4
	231	00001100110011	-2		231	11100000110000	-4
25	232	00001100011110	-2	4(D)	232	11100001100000	-4
	233	00001100001111	-2		233	11100011000000	-4
	234	00001111111000	0		234	11110000000111	0
	235	00001111110001	0		235	11110000001110	0
	236	00001111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	00001111001110	0		238	11110000110001	0
	239	00001111000111	0		239	11110000111000	0
	240	00001110011110	0		240	11110001100001	0
	241	00001110001111	0		241	11110001110000	0
30	242	00001100111110	0	5(D)	242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00000111111000	-2		244	11110000000110	-2
	245	00000111110001	-2		245	11110000001100	-2
	246	00000111100110	-2		246	11110000011000	-2
	247	00000111100011	-2		247	11110000110000	-2
	248	00000111000111	-2		248	11110001100000	-2
	249	00000110001111	-2		249	11110011000000	-2
	250	00000111111100	0		250	11111000000011	0
	251	00000111110001	0		251	11111000000110	0
35	252	00000111100110	0	5(D)	252	11111000001100	0
	253	00000111100011	0		253	11111000011000	0
	254	00000111001111	0		254	11111000110000	0
	255	00000110011111	0		255	11111001100000	0
40				5(D)			
45				5(D)			
50				5(D)			
55				5(D)			

The modulation codes in 5(B) of Table 4 can be changed as shown in Table 12 to improve the end DSV: the six modulation codes whose CDS = 0 in 5(B) is reduced to four by two, and two new modulation codes which have not been used and whose CDS = 2 are added.

TABLE 12

8-bit data	Modulation codes	CDS
248	11111000110001	2
249	11111000111000	2
250	11111001100001	2
251	11111001110000	2

Selecting a modulation code whose CDS = 2 makes it possible to adjust the end DSV at the end of the selected modulation code to 0, when the end DSV at the end of the preceding modulation code is -2, the last bit pattern of the preceding code is any one of the patterns "01", "100", "1000", "10000", "100000", and "1000000", and the signal data is 250 or 251. The modulation codes in 5(C) of Table 5, which are the reversal codes of those in 5(B) of Table 4, can also be changed as shown in Table 13.

TABLE 13

8-bit data	Modulation codes	CDS
248	00000111001110	-2
249	00000111000111	-2
250	00000110011110	-2
251	00000110001111	-2

Modulation codes which are not used in Tables 4 and 12, and whose CDS = 4 can be used in place of the modulation codes in Table 4 or in Tables 4 and 12. Selecting a modulation code whose CDS = 4 when the end DSV at the end of the preceding modulation code is -2 can improve the bit DSV of the selected modulation code because the bit DSV is sure to take 0 at a particular bit in the selected modulation code.

The modulation codes in Table 5 and Table 13, which are reversal patterns of the codes in Table 4 and Table 12, can be changed in a manner similar to the above, resulting in a similar improvement.

The modulation codes specified to correspond to 8-bit data in Tables 4 and 5 are an example, and so the combination of the modulation codes and the 8-bit code can be altered.



Types of the modulation codes that are allowed to take place according to the end pattern of the preceding modulation code are shown in Table 6.

TABLE 6

5

10			Consecutive number of "0" bits at the beginning of modulation code					Consecutive number of "1" bits at the beginning of modulation code				
15	End pattern of the preceding modulation codes	$CDS \geq 0$	1 (A)	2 (A)	3 (A)	4 (A)	5 (A)	1 (B)	2 (B)	3 (B)	4 (B)	5 (B)
		$CDS \leq 0$	1 (C)	2 (C)	3 (C)	4 (C)	5 (C)	1 (D)	2 (D)	3 (D)	4 (D)	5 (D)
20		.....110	o	o	o	o	o					
		.....1100	o	o	o	o	o		o	o	o	o
25		.....11000	o	o	o	o			o	o	o	o
		.....110000	o	o	o				o	o	o	o
30		....1100000	o	o					o	o	o	o
		...11000000*	o						o	o	o	o
35		.....001							o	o	o	o
		.....0011		o	o	o	o	o	o	o	o	o
40		.....00111		o	o	o	o	o	o	o	o	
		.....001111		o	o	o	o	o	o	o		
45		....0011111		o	o	o	o	o	o			
		...00111111		o	o	o	o	o	o			
50		...00111111*		o	o	o	o	o				

Notes with regard to Table 6:

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"o" mark indicates that the modulation codes are allowed.

"\*" indicates that a modulation code whose  $CDS \geq 0$  is selected when the end pattern of the preceding modulation code is "...11000000", and that a modulation code whose  $CDS \leq 0$  is selected when the end pattern

of the preceding modulation code is "...00111111".

For example, when the end pattern of the preceding modulation code is "...11000", and the end DSV of the preceding modulation code is -2, the modulation codes of classes 1(A), 2(A), 3(A), 4(A), 2(B), 3(B), 4(B), and 5(B) in Table 4 can take place as a current modulation code because the current modulation code to be selected must satisfy the requirements that the CDS  $\geq 0$  and the number of consecutive identical bits in the joint portion of the two codes is 2 - 7.

In this case, suppose that the current 8-bit data is "166". Then, one of the two possible modulation codes "00111110011001" (CDS = 2; 2(A)), and "11001111100110" (CDS = 4; 2(B)) shown in Table 4 is selected: the end DSV of the preceding modulation code and the CDS of the current modulation code are added so as to obtain the end DSV of the current modulation code; the modulation code which will give less end DSV is selected, that is, the modulation code "00111110011001" (CDS = 2) is selected. The resultant end DSV is 0 and it indicates that the direct current component is removed.

Fig. 3A shows the CNR (carrier-to-noise ratio) characteristics when a sine wave recorded on magnetic tape is reproduced, Fig. 3B shows the power spectrum at the output terminal of the modulator of the embodiment when random 8-bit data are inputted to the modulator, and Fig. 3C shows the power spectrum of the scrambled NRZ at the output terminal of the scrambled NRZ modulator when random 8-bit data are inputted to the scrambled NRZ modulator. From these figures, it is seen that the power spectrum according to the digital modulation method of the present invention includes no direct current component, and is included within a record-reproduction bandwidth in which the high CNR is obtained. As a result, the record-reproduction characteristics of the magnetic tape and head system can be effectively used. Furthermore, the minimum magnetization transition width of the modulation codes of the digital modulation method according to the present invention is 1.14 times the minimum magnetization transition width of the scrambled NRZ. Consequently, the intercode interference can be reduced.

As described above, the embodiment restricts the number of consecutive identical bits in a stream of modulation codes to 2 - 7. As a result, the minimum magnetization transition width is  $1.14T$  ( $= (28)T/14$ , where  $T$  is the bit period of the 8-bit data), the maximum magnetization transition width is  $4.00T$  ( $= (7 \times 8)T/14$ ), DR is  $1.14$  ( $= (2 \times 8)/14$ ), and the ratio of the maximum magnetization transition width to the minimum magnetization transition width is 3.5. Consequently, the bit error rate of the magnetic recording is reduced, and the high-density recording becomes possible. In addition, azimuth recording and high quality over-writing become possible.

Furthermore, the embodiment restricts the absolute value of CDS of the modulation codes equal to or less than 4, allocates up to 4 modulation codes to each 8-bit data according to the DSV at the end of the preceding modulation code and the end pattern of the preceding code, and selects the modulation code the end DSV of which gives the least absolute value. As a result, the absolute value of the end DSV which is calculated at the end of each modulation code is within 2, and the absolute value of the bit DSV which is calculated at each bit of a modulation code is within 7. Thus, the direct current component can be effectively removed, and hence, the transmission of the modulation codes becomes possible by using a rotary transformer that does not pass the direct current component.

## [B] SECOND EMBODIMENT

Fig. 6 is a block diagram showing a digital modulation apparatus for carrying out the digital modulation according to the second embodiment of the digital modulation method of the present invention.

In Fig. 6, 8-bit digital data 1 is converted to a 14-bit digital modulation code by an encoder 2. An end pattern judgement portion 3 converts the end pattern of the last 5-bits of the 14-bit digital modulation code into a 4-bit code in Table 21 (although the last 7 bits of the modulation codes are given in Table 21, only the last 5 bits should be considered). A CDS calculation portion 5 computes the CDS of the 14-bit digital modulation code supplied, and converts the resultant CDS into a 3-bit code in Table 20. A DSV calculation portion 4 adds the CDS of the current 14-bit digital modulation code to the DSV at the end of the preceding 14-bit digital modulation code, yielding a new DSV, and converts the new DSV into a 3-bit code shown in Table 20.

A parallel-to-serial converter 8 converts the 14-bit digital modulation code into a serial signal in synchronism with a clock signal 9. A recording portion 10 records the serial modulation signal produced from the parallel-to-serial converter 8 on a recording medium such as magnetic tape or the like.

TABLE 20

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CDS,DSV of modulation codes	Corresponding 3-bit codes
-6	000
-4	001
-2	010
0	011
2	100
4	101
6	110

TABLE 21

5	End pattern of the preceding modulation codes	Corresponding 4-bit codes
10	... xxxx110	0000
15	... xxx1100	0001
20	... xx11000	0010
25	... x110000	0011
30	... 1100000	0100
35	... xxxx001	1000
40	... xxx0011	1001
45	... xx00111	1010
50	... x001111	1011
55	... 0011111	1100

x: Don't care bit

The resultant CDS converted into a 3-bit code shown in Table 20 by the CDS calculation portion 5, is supplied to the DSV calculation portion 4.

The DSV calculation portion 4 converts the resultant DSV into a 3-bit code shown in Table 20, and supplies the code to the encoder 2 via a latch 6. The end pattern judgement portion 3 converts the last five bits into a 4-bit code in Table 21, and supplies the code to the encoder 2 via a latch 7.

Next, the method for selecting a 14-bit digital modulation code corresponding to each inputted 8-bit digital data will be described.

First, the method for selecting up to four 14-bit digital modulation codes for each 8-bit digital data will be described.

The 14-bit digital modulation code is selected by the procedures of

- (a) selecting among the  $2^{14}$  14-bit digital codes, a digital code the numbers of consecutive identical bits in which are 6 or less in the first 7 bits, 2 - 7 from the second bit to 13th bit, and 5 or less in the last 6 bits, and repeating this selecting procedure,
- (b) selecting among the 14-bit digital codes selected at the procedure (a), a digital code the first bit of which is "0", and the CDS of which has the absolute value equal to or less than 6, and repeating this selecting procedure,
- (c) selecting among the 14-bit digital codes selected at the procedure (a), a digital code the first bit of which

is "1", and the CDS of which has the absolute value equal to or less than 4, and repeating this selecting procedure,

(d) selecting among the 14-bit digital codes selected at the procedure (b), a digital code the value of CDS of which is 0, and pairing the selected 14-bit digital code with the reversal code thereof to make the 2 digital codes one group, and repeating this selecting procedure,

(e) selecting among the 14-bit digital codes selected at the procedure (b), a digital code the value of CDS of which is +2, +4 or +6, selecting among the 14-bit digital codes selected at the procedure (c), a digital code the value of CDS of which is +2 or +4, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure, and

(f) selecting 256 groups among the groups formed in the above procedures as the 14-bit digital modulation codes.

Next, the selection procedure of a 14-bit digital modulation code (current modulation code) corresponding to inputted 8-bit data will be described with reference to Fig. 7, which is a flowchart showing the modulation procedure according to the digital modulation method of the present invention.

At step S1, DSV at the end of the preceding modulation code is calculated.

At step S2, the end pattern of the preceding modulation code is judged.

At step S3, when the  $DSV < 0$ , the modulation codes in Table 17 are selected, and when  $DSV > 0$ , the modulation codes in Table 18 are selected. On the other hand, when  $DSV = 0$  and the end pattern of the preceding code is any one of "...110", "...0011", "...00111", "...001111", and "...0011111", the modulation codes in Table 18 are selected. Further, when  $DSV = 0$  and the end pattern of the preceding code is any one of "...1100", "...11000", "...110000", and "...001", the modulation codes in Table 17 are selected.

At step S4, a modulation code is selected among the selected codes at step S3 and among the classes 1(A) - 6(D) in Tables 17 and 18, according to the end pattern of the preceding modulation code.

At step S5, is selected a modulation code which gives DSV the absolute value of which is minimum when two or more modulation codes are selected at step S4. In this case, the DSV is obtained by adding the DSV at the end of the preceding modulation code and the CDS of the current modulation code.

At step S6, a modulation code that satisfies the following requirements is selected when two or more modulation codes selected at step S5 have the same minimum DSV.

When  $DSV < 0$  at the end of the preceding modulation code, a modulation code whose first bit is "1" is selected.

When  $DSV > 0$  at the end of the preceding modulation code, a modulation code whose first bit is "0" is selected.

When  $DSV = 0$  at the end of the preceding modulation code, a modulation code whose first bit is opposite to the last bit of the preceding modulation code.

The 14-bit digital modulation code thus selected is fed to the parallel-to-serial converter 8. The modulation code entered the parallel-to-serial converter 8 is serially read out in synchronism with the clock 9, and is fed to the recording portion 10, where the 14-bit digital modulation code is recorded on the record medium such as magnetic tape or the like.

On the other hand, the 14-bit digital modulation code selected by the encoder 2 is supplied to the DSV calculation portion 4, and to the modulation code end pattern judgement portion 3. The DSV calculation portion 4 adds the CDS of the current modulation code to the DSV at the end of the preceding modulation code to obtain a new DSV. The new DSV is converted into a 3-bit code according to Table 20, and is supplied to the encoder 2 through latch 6. The end pattern judgement portion 3 converts the last 5 bits of the 14-bit modulation code into a 4-bit code according to Table 21, and supplies the 4-bit code to the encoder 2 through latch 7.

The above procedure is repeated for every 8-bit input data. Thus, a 14-bit digital modulation code train is obtained, in which the number of consecutive identical bits is restricted to 2 - 7, and the absolute value of the DSV is restricted equal to or less than 8.

Next, the 14-bit digital modulation code produced from the encoder 2 in Fig. 6 will be described.

The 14-bit digital modulation code converted from the 8-bit code satisfies the following requirements.

(1) The number of consecutive identical bits in the first 7 bits is equal to or less than 6.

(2) The number of consecutive identical bits included from the second bit to the 13th bit is 2 - 7.

(3) The number of consecutive identical bits included in the last 6 bits is equal to or less than 5.

(4) The absolute value of CDS of the modulation code is equal to or less than 6.

The end patterns of the modulation codes that satisfy the above requirements (1) to (4) are summed up as the following 10 items (A) - (K).

5 (A) ... .. 110  
 (B) ... .. 1100  
 (C) ... .. 11000  
 (D) ... .. 110000  
 (E) ... .. 1100000  
 10 (F) ... .. 001  
 (G) ... .. 0011  
 (H) ... .. 00111  
 (J) ... .. 001111  
 15 (K) ... .. 0011111

The beginning of the modulation code succeeding to the modulation codes (A) - (K) is one of the following items.

20 First, the beginning of the modulation code succeeding to the modulation code (A) is one of the following five items (A1) - (A6).

25 (A1) 011 ... ..  
 (A2) 0011... ..  
  
 (A3) 00011 ... ..  
 30 (A4) 000011 ... ..  
 (A5) 0000011 ... ..  
 (A6) 00000011 ... ..

35 Second, the beginning of the modulation code succeeding to the modulation code (B) is one of the following ten items (B1) - (B10).

40 (B1) 011 ... ..  
 (B2) 0011... ..  
 (B3) 00011 ... ..  
 (B4) 000011 ... ..  
 (B5) 0000011 ... ..  
 45 (B6) 1100... ..  
 (B7) 11100 ... ..  
 (B8) 111100 ... ..  
 50 (B9) 1111100 ... ..  
 (B10) 11111100 ... ..

55 The beginning of the modulation code succeeding to the modulation code (C) is one of the following nine items (C1) - (C9).

	(C1)	011 ... ..
	(C2)	0011... ..
5	(C3)	00011 ... ..
	(C4)	000011 ... ..
	(C5)	1100... ..
	(C6)	11100 ... ..
10	(C7)	111100 ... ..
	(C8)	1111100 ... ..
	(C9)	11111100 ... ..

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The beginning of the modulation code succeeding to the modulation code (D) is one of the following eight items (D1) - (D8).

20	(D1)	011 ... ..
	(D2)	0011... ..
	(D3)	00011 ... ..
25	(D4)	1100... ..
	(D5)	11100 ... ..
	(D6)	111100 ... ..
	(D7)	1111100 ... ..
30	(D8)	11111100 ... ..

The beginning of the modulation code succeeding to the modulation code (E) is one of the following seven items (E1) - (E7).

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	(E1)	011 ... ..
	(E2)	0011... ..
40	(E3)	1100... ..
	(E4)	11100 ... ..
	(E5)	111100 ... ..
	(E6)	1111100 ... ..
45	(E7)	11111100 ... ..

The beginning of the modulation code succeeding to the modulation code (F) is one of the reversal patterns of the modulation codes (A1) - (A6).

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The beginning of the modulation code succeeding to the modulation code (G) is one of the reversal patterns of the modulation codes (B1) - (B10).

The beginning of the modulation code succeeding to the modulation code (H) is one of the reversal patterns of the modulation codes (C1) - (C9).

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The beginning of the modulation code succeeding to the modulation code (J) is one of the reversal patterns of the modulation codes (D1) - (D8).

The beginning of the modulation code succeeding to the modulation code (K) is one of the reversal patterns of the modulation codes (E1) - (E7).

The numbers of the modulation codes that satisfy the requirements (1) - (4) are shown in Tables 14 and

15.

TABLE 14

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Beginning pattern of modulation codes	The number of possible modulation codes									
	CDS Value								CDS $\leq 0$	CDS $\geq 0$
	-6	-4	-2	0	2	4	6	Total		
00000011..	5	6	5	1	0	0	0	17	17	1
0000011....	6	9	8	6	0	0	0	29	29	6
000011.....	6	12	14	10	5	0	0	47	42	15
00011.....	7	14	21	20	10	4	0	76	62	34
0011.....	5	17	28	33	25	10	3	121	83	71
011.....	4	15	37	49	46	31	8	190	105	134
Total	33	73	113	119	86	45	11	480	338	261



TABLE 15

Beginning pattern of modulation codes	The number of possible modulation codes									
	CDS Value									
	-6	-4	-2	0	2	4	6	Total	CDS $\leq 0$	CDS $\geq 0$
11111100..	0	0	0	1	5	6	5	17	1	17
1111100....	0	0	0	6	8	9	6	29	6	29
111100.....	0	0	5	10	14	12	6	47	15	42
11100.....	0	4	10	20	21	14	7	76	34	62
1100.....	3	10	25	33	28	17	5	121	71	83
100.....	8	31	46	49	37	15	4	190	134	105
Total	11	45	86	119	113	73	33	480	261	338

More than 256 modulation codes whose  $CDS \geq 0$ , and more than 256 modulation codes whose  $CDS \leq 0$  are necessary, which follow one of the modulation codes (A) - (K). In addition, the converted modulation code must correspond to one 8-bit data to avoid transmission error.

The number of modulation codes that can succeed one of the modulation codes (A) - (K) is shown in Table 16.

TABLE 16

End pattern of modulation codes	The number of possible successive modulation codes									
	CDS Value								CDS $\leq 0$	CDS $\geq 0$
	-6	-4	-2	0	2	4	6	Total		
.....110	33	73	113	119	86	45	11	480	338	261
.....1100	31	81	148	188	162	103	40	753	448	493
.....11000	25	72	140	182	162	103	40	724	419	487
....110000	19	60	126	172	157	103	40	677	377	472
...1100000	12	46	105	152	147	99	40	601	315	438
.....001	11	45	86	119	113	73	33	480	261	338
.....0011	40	103	162	188	148	81	31	753	493	448
.....00111	40	103	162	182	140	72	25	724	487	419
....001111	40	103	157	172	126	60	19	677	472	377
...0011111	40	99	147	157	105	46	12	601	438	315

Fig. 8 shows the number of modulation codes of respective classes when  $CDS \geq 0$ , and Fig. 9 shows the number of modulation code of respective classes when  $CDS \leq 0$ .

Tables 17 and 18 show the correspondence between the 8-bit data and the modulation codes: Table 17 shows the correspondence when  $CDS \geq 0$ ; and Table 18 shows the correspondence when  $CDS \leq 0$ .

Table 17 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	0	0111110000001	0		0	1000000111110	0
	1	0111110011000	0		1	1000001100111	0
	2	0111110001100	0		2	1000001110011	0
	3	0111110000110	0		3	1000001111001	0
	4	0111110000011	0		4	1000001111100	0
10	5	0111110000001	0		5	1000001111100	0
	6	0111100111000	0		6	1000011000111	0
	7	0111100110001	0		7	1000011001110	0
	8	0111100011100	0		8	1000011100011	0
	9	0111100011001	0		9	1000011100110	0
	10	0111100001110	0		10	1000011110001	0
	11	0111100001101	0		11	1000011110010	0
15	12	0111100000111	0		12	1000011111000	0
	13	0111100000011	0		13	1000011111000	0
	14	0111001111000	0		14	1000110000111	0
	15	0111001110001	0		15	1000110001110	0
	16	0111001100110	0		16	1000110011001	0
	17	0111001100011	0		17	1000110011100	0
	18	0111001100001	0		18	1000110011100	0
20	19	0111000111000	0		19	1000111000011	0
	20	0111000111001	0		20	1000111000110	0
	21	0111000110011	0		21	1000111001100	0
	22	0111000110001	0		22	1000111001100	0
	23	0111000011110	0		23	1000111100001	0
	24	0111000011101	0		24	1000111100010	0
	25	0111000011001	0		25	1000111100110	0
	26	0111000001110	0		26	1000111110000	0
25	27	0111000000111	0		27	1000111110000	0
	28	0110011111000	0		28	1001100000111	0
	29	0110011110001	0		29	1001100001110	0
	30	0110011100110	0		30	1001100011001	0
	31	0110011100011	0		31	1001100011100	0
	32	0110011100001	0		32	1001100011100	0
30	33	0110011001110	0		33	1001100110001	0
	34	0110011001101	0		34	1001100110010	0
	35	0110011000111	0		35	1001100111000	0
	36	0110011000011	0		36	1001100111000	0
	37	0110001111000	0		37	1001110000011	0
	38	0110001111001	0		38	1001110000110	0
	39	0110001110011	0		39	1001110001100	0
35	40	0110001110001	0		40	1001110001100	0
	41	0110001100111	0		41	1001110011000	0
	42	0110001100011	0		42	1001110011000	0
	43	0110000111110	0		43	1001110000011	0
	44	0110000111101	0		44	1001110000010	0
	45	0110000111001	0		45	1001110001100	0
	46	0110000110011	0		46	1001110011000	0
	47	0110000011110	0		47	1001111000001	0
40	48	0110000001111	0		48	1001111100000	0
	49	0111111100001	2		49	1000001111110	2
	50	0111111001100	2		50	1000011001111	2
	51	0111111000110	2		51	1000011100111	2
	52	0111111000011	2		52	1000011110011	2
	53	0111111000001	2		53	1000011111001	2
	54	0111110011100	2		54	1000011111001	2
	55	0111110011001	2		55	1000011111100	2
45	56	0111110001110	2		56	1000110001111	2
	57	0111110001101	2		57	1000110011110	2
	58	0111110000111	2		58	1000111000111	2
	59	0111110000011	2		59	1000111001110	2
	60	0111100111100	2		60	1000111100011	2
	61	0111100111001	2		61	1000111100110	2
	62	0111100110011	2		62	1000111110001	2
50	63	0111100110001	2		63	1000111110010	2
	64	0111100011110	2		64	1000111110001	2
	65	0111100011101	2		65	1000111111000	2
	66	0111100011001	2		66	1001100001111	2

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Table 17 (CDS  $\geq 0$ )

	Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5								
		67	01111000011110	2		67	10011000111110	2
		68	01111000001111	2		68	10011001100111	2
		69	01110011111000	2		69	10011001110011	2
		70	01110011110001	2		70	10011001111001	2
10		71	01110011100110	2		71	10011001111100	2
		72	01110011100011	2		72	10011100001111	2
		73	01110011001110	2		73	10011100011110	2
		74	01110011000111	2		74	10011100110011	2
		75	01110001111100	2		75	10011100111001	2
		76	01110001111001	2		76	10011100111100	2
		77	01110001110011	2	1 (B)	77	10011100001111	2
		78	01110001100111	2		78	10011110001110	2
15		79	01110000111110	2		79	10011110011001	2
		80	01110000011111	2		80	10011110011100	2
		81	01100111111000	2		81	10011111000011	2
		82	01100111110001	2		82	10011111000110	2
		83	01100111100110	2		83	10011111001100	2
		84	01100111100011	2		84	10011111100001	2
		85	01100111100110	2		85	10011111110000	2
20	1 (A)	86	01100111000111	2		86	10011111100011	4
		87	01100110011110	2		87	11000011111110	4
		88	01100110001111	2		88	11000110011111	4
		89	01100011111100	2		89	11000111001111	4
		90	01100011111001	2		90	11000111100111	4
		91	01100011110011	2		91	11000111110011	4
		92	01100011100111	2		92	11000111111001	4
25		93	01100011001111	2		93	11000111111100	4
		94	01100001111110	2		94	11001100011111	4
		95	01111111001100	4		95	11001100111110	4
		96	01111111000110	4		96	11001110001111	4
		97	01111111000011	4		97	11001110011110	4
		98	01111110011100	4		98	11001111000111	4
		99	01111110011001	4		99	11001111001110	4
30		100	01111110001110	4		100	11001111100011	4
		101	01111110000111	4		101	11000001111110	2
		102	01111100111100	4		102	11000011001111	2
		103	01111100111001	4		103	11000011100111	2
		104	01111100110011	4		104	11000011110011	2
		105	01111100011110	4		105	11000011111001	2
		106	01111100001111	4	2 (B)	106	11000011111100	2
35		107	01111001111100	4		107	11000110001111	2
		108	01111001111001	4		108	11000110011110	2
		109	01111001110011	4		109	11000111000111	2
		110	01111001100111	4		110	11000111001110	2
		111	01111000111110	4		111	11000111100011	2
		112	01111000011111	4		112	11000111100110	2
		113	01110011111100	4		113	11000111110001	2
		114	01110011111001	4		114	11000111111000	2
40		115	01110011110011	4		115	11001100001111	2
		116	01110011100111	4		116	11001100011110	2
		117	01110011001111	4		117	11001100110011	2
		118	01110001111110	4		118	11001100111001	2
		119	01100111111100	4		119	11001100111100	2
		120	01100111111001	4		120	11001110000111	2
		121	01100111110011	4		121	11001110001110	2
45		122	01100111100111	4		122	11001110011001	2
		123	01100111001111	4		123	11001110011100	2
		124	01100110001111	4		124	11001111000011	2
		125	01100011111110	4		125	11001111000110	2
		126	01111111000111	6		126	110011111001100	2
		127	01111110001111	6		127	110011111100001	2
		128	01111100011111	6		128	110011111100000	2
50		129	00111111100000	0		129	11000000011111	0
		130	00111111000001	0		130	11000000111110	0
	2 (A)	131	00111110011000	0		131	11000001100111	0
		132	00111110001100	0		132	11000001110011	0
		133	00111110000110	0		133	11000001111001	0

Table 17 (CDS  $\geq 0$ )

	Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5		134	00111110000011	0		134	11000001111100	0
		135	00111100111000	0		135	11000011000111	0
		136	00111100110001	0		136	11000011001110	0
		137	00111100011100	0		137	11000011100011	0
10		138	00111100011001	0		138	11000011100110	0
		139	00111100001110	0		139	11000011110001	0
		140	00111100000111	0		140	11000011111000	0
		141	00111001111000	0		141	11000110000111	0
		142	00111001110001	0		142	11000110001110	0
		143	00111001100110	0		143	11000110011001	0
		144	00111001100011	0		144	11000110011100	0
15		145	00111000111100	0		145	11000110000111	0
		146	00111000111001	0	2 (B)	146	11000110001110	0
		147	00111000110011	0		147	11000110011000	0
		148	00111000011110	0		148	11000111000011	0
		149	00111000001111	0		149	11000111100000	0
		150	00110011111000	0		150	11001100000111	0
		151	00110011110001	0		151	11001100001110	0
20		152	00110011100110	0		152	11001100011001	0
		153	00110011100011	0		153	11001100011100	0
		154	00110011001110	0		154	11001100110001	0
		155	00110011000111	0		155	11001100111000	0
		156	00110001111100	0		156	11001110000011	0
		157	00110001111001	0		157	11001110000110	0
		158	00110001110011	0		158	11001110001100	0
25	2 (A)	159	00110001100111	0		159	11001110011000	0
		160	00110000111110	0		160	11001111000001	0
		161	00110000011111	0		161	11001111100000	0
		162	00111111100001	2		162	11001111100110	4
		163	00111111001100	2		163	11001111110001	4
		164	00111111000110	2		164	11001111111000	4
		165	00111111000011	2		165	11100001111110	4
30		166	00111110011100	2		166	11100011001111	4
		167	00111110011001	2		167	11100011100111	4
		168	00111110001110	2		168	11100011110011	4
		169	00111110000111	2		169	11100011111001	4
		170	00111100111100	2		170	11100011111100	4
		171	00111100111001	2		171	11100110001111	4
		172	00111100110011	2		172	11100110011110	4
		173	00111100011110	2		173	11100111000111	4
35		174	00111100001111	2		174	11100111001110	4
		175	00111001111100	2		175	11100111100011	4
		176	00111001111001	2		176	11100111100110	4
		177	00111001110011	2		177	11100111110001	4
		178	00111001100111	2		178	11100111111000	4
		179	00111000111110	2		179	11100000011111	2
		180	00111000011111	2		180	11100000111110	2
40		181	00110011111100	2	3 (B)	181	11100001100111	2
		182	00110011111001	2		182	11100001110011	2
		183	00110011110011	2		183	11100001111001	2
		184	00110011100111	2		184	11100001111100	2
		185	00110011001111	2		185	11100011000111	2
		186	00110001111110	2		186	11100011001110	2
		187	00111111100110	4		187	11100011100011	2
		188	00111111100011	4		188	11100011100110	2
45		189	00111111001110	4		189	11100011110001	2
		190	00111111000111	4		190	11100011111000	2
		191	00111110011110	4		191	11100110000111	2
		192	00111110001111	4		192	11100110001110	2
		193	00111100111110	4		193	11100110011001	2
		194	00111100011111	4		194	11100110011100	2
		195	00111001111110	4		195	11100111000011	2
50		196	00110011111110	4		196	11100111000110	2
		197	00111111100111	6		197	11100111001100	2
		198	00111111001111	6		198	11100111100001	2
		199	00111110011111	6		199	11100111110000	2

Table 17 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
3 (A)	200	0001111110000	0	3 (B)	200	11100000001111	0
	201	00011111100001	0		201	11100000001110	0
	202	00011111001100	0		202	111000000110011	0
	203	00011111000110	0		203	11100000011001	0
	204	00011111000011	0		204	11100000011100	0
	205	000111110011100	0		205	11100001100011	0
	206	00011110011001	0		206	11100001100110	0
	207	00011110001110	0		207	11100001110001	0
	208	00011110000111	0		208	11100001111000	0
	209	00011100111100	0		209	11100011000011	0
4 (A)	210	00011100111001	0	4 (B)	210	11100011000110	0
	211	00011100110011	0		211	11100011001100	0
	212	00011100011110	0		212	11100011100001	0
	213	00011100001111	0		213	11100011110000	0
	214	000111001111100	0		214	11100110000011	0
	215	000111001111001	0		215	11100110000110	0
	216	000111001110011	0		216	11100110001100	0
	217	000111001100111	0		217	11100110011000	0
	218	000111000111110	0		218	11100111000001	0
	219	000111000011111	0		219	11100111100000	0
5 (A)	220	00011111110001	2	5 (B)	220	11110000001111	2
	221	000111111100110	2		221	11110000001110	2
	222	000111111100011	2		222	111100000110011	2
	223	000111111001110	2		223	111100000111001	2
	224	000111111000111	2		224	111100000111100	2
	225	000111110011110	2		225	11110001100011	2
	226	000111110001111	2		226	11110001100110	2
	227	000111100111110	2		227	11110001110001	2
	228	000111100011111	2		228	11110001111000	2
	229	000111001111110	2		229	11110011000011	2
6 (A)	230	00011111110011	4	6 (B)	230	11110011000110	2
	231	00011111100111	4		231	11110011001100	2
	232	00011111001111	4		232	11110011100001	2
	233	00011111001111	4		233	11110011110000	2
	234	00001111111000	0		234	11110000000111	0
	235	000011111110001	0		235	11110000001110	0
	236	000011111100110	0		236	111100000011001	0
	237	000011111100011	0		237	111100000011100	0
	238	000011111001110	0		238	111100000110001	0
	239	000011111000111	0		239	111100000111000	0
7 (A)	240	00001110011110	0	7 (B)	240	111100001100001	0
	241	00001110001111	0		241	111100001110000	0
	242	00001100111110	0		242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00001111111001	2		244	11111000000111	2
	245	00001111110011	2		245	111110000011100	2
	246	00001111100111	2		246	111110000110001	2
	247	00001111001111	2		247	111110000111000	2
	248	00001110011111	2		248	11111001110000	2
	249	00000111111100	0		249	11111000000011	0
8 (A)	250	00000111111001	0	8 (B)	250	111110000000110	0
	251	00000111110011	0		251	111110000001100	0
	252	00000111100111	0		252	111110000011000	0
	253	00000111001111	0		253	111110000110000	0
	254	00000110011111	0		254	11111001100000	0
	255	00000111111110	0		255	11111100000001	0

Table 18 (CDS  $\leq 0$ )

	Class	8-bit data	Modulation codes beginning with "0"	CDS		Class	8-bit data	Modulation codes beginning with "1"	CDS
5		0	0111110000001	0			0	1000000111110	0
		1	01111100110000	0			1	10000011001111	0
		2	01111100011000	0			2	10000011100111	0
		3	01111100001100	0			3	10000011110011	0
		4	011111000000110	0			4	10000011111001	0
		5	011111000000011	0			5	10000011111100	0
10		6	01111001110000	0			6	10000110001111	0
		7	01111001100001	0			7	10000110011110	0
		8	01111000111000	0			8	10000111000011	0
		9	01111000110001	0			9	10000111001110	0
		10	01111000011100	0			10	10000111100011	0
		11	01111000011001	0			11	10000111110010	0
		12	01111000001110	0			12	10000111110001	0
15		13	011110000000111	0			13	10000111111000	0
		14	01110011110000	0			14	10001100001111	0
		15	01110011100001	0			15	10001100011110	0
		16	01110011001100	0			16	10001100110011	0
		17	01110011000110	0			17	10001100111001	0
		18	01110011000011	0			18	10001100111100	0
		19	01110001111000	0			19	10001110000011	0
20		20	01110001110001	0			20	10001110001110	0
		21	01110001100110	0			21	10001110011001	0
		22	01110001100011	0			22	10001110011100	0
		23	01110000111100	0			23	10001111000011	0
		24	01110000111001	0			24	10001111000110	0
		25	01110000110011	0			25	10001111001100	0
25	1 (C)	26	01110000011110	0	1 (D)		26	10001111100001	0
		27	01110000001111	0			27	10001111110000	0
		28	01100111110000	0			28	10011000001111	0
		29	01100111100001	0			29	10011000011110	0
		30	01100111001100	0			30	10011000110011	0
		31	01100111000110	0			31	10011000111001	0
		32	01100111000011	0			32	10011000111100	0
		33	01100110011100	0			33	10011001100011	0
30		34	01100110011001	0			34	10011001100110	0
		35	01100110001110	0			35	10011001110001	0
		36	01100110000111	0			36	10011001111000	0
		37	01100011111000	0			37	10011100000011	0
		38	01100011110001	0			38	10011100001110	0
		39	01100011100110	0			39	10011100011001	0
		40	01100011100011	0			40	10011100011100	0
		41	01100011001110	0			41	10011100110001	0
35		42	01100011000111	0			42	10011100111000	0
		43	01100001111100	0			43	10011110000011	0
		44	01100001111001	0			44	10011110000110	0
		45	01100001110011	0			45	10011110001100	0
		46	01100001100111	0			46	10011110011000	0
		47	01100000111110	0			47	10011111000001	0
		48	01100000011111	0			48	10011111000000	0
40		49	01111100000001	-2			49	10000000111110	-2
		50	01111001100000	-2			50	10000001100111	-2
		51	01111000110000	-2			51	10000001110011	-2
		52	01111000011000	-2			52	10000001111001	-2
		53	01111000001100	-2			53	10000001111100	-2
		54	011110000000110	-2			54	10000011000111	-2
		55	011110000000011	-2			55	10000011001110	-2
45		56	01110011100000	-2			56	10000011100011	-2
		57	01110011000001	-2			57	10000011100110	-2
		58	01110001110000	-2			58	10000011110001	-2
		59	01110001100001	-2			59	10000011111000	-2
		60	01110000111000	-2			60	10000110000111	-2
		61	01110000110001	-2			61	10000110001110	-2
		62	01110000011100	-2			62	10000110011001	-2
50		63	01110000011001	-2			63	10000110011100	-2
		64	01110000001110	-2			64	10000111000011	-2
		65	01110000000011	-2			65	10000111000110	-2
		66	01100111100000	-2			66	10000111001100	-2

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Table 18 (CDS  $\leq 0$ )

	Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	2 (C)	133	00111110000110	0	2 (D)	133	11000001111001	0
		134	00111110000011	0		134	11000001111100	0
		135	00111100111000	0		135	11000011000111	0
		136	00111100110001	0		136	11000011001110	0
		137	00111100011100	0		137	11000011100011	0
		138	00111100011001	0		138	11000011100110	0
		139	00111100001110	0		139	11000011110001	0
10		140	00111100000111	0		140	11000011111000	0
		141	00111001111000	0		141	11000110000111	0
		142	00111001110001	0		142	11000110001110	0
		143	00111001100110	0		143	11000110011001	0
		144	00111001100011	0		144	11000110011100	0
		145	00111000111100	0		145	11000111000011	0
15		146	00111000111001	0		146	11000111000110	0
		147	00111000110011	0		147	11000111001100	0
		148	00111000111110	0		148	11000111100001	0
		149	00111000001111	0		149	11000111110000	0
		150	00110011111000	0		150	11001100000111	0
		151	00110011110001	0		151	11001100001110	0
		152	00110011100110	0		152	11001100011001	0
		153	00110011100011	0		153	11001100011100	0
20		154	00110011001110	0		154	11001100110001	0
		155	00110011000111	0		155	11001100111000	0
		156	00110001111100	0		156	11001110000011	0
		157	00110001111001	0		157	11001110000110	0
		158	00110001110011	0		158	11001110001100	0
		159	00110001100111	0		159	11001110011000	0
25		160	00110000111110	0		160	11001111000001	0
		161	00110000011111	0		161	11001111100000	0
		162	00110000011001	-4		162	11000000011110	-2
		163	00110000001110	-4		163	11000000110011	-2
		164	00110000000111	-4		164	11000000111001	-2
	3 (C)	165	00011110000001	-4		165	11000000111100	-2
		166	00011100110000	-4		166	11000001100011	-2
		167	00011100011000	-4		167	11000001100110	-2
		168	00011100001100	-4		168	11000001110001	-2
30		169	00011100000110	-4		169	11000001111000	-2
		170	00011100000011	-4		170	11000011000011	-2
		171	00011001110000	-4		171	11000011000110	-2
		172	00011001100001	-4		172	11000011001100	-2
		173	00011000111000	-4		173	11000011100001	-2
		174	00011000110001	-4		174	11000011110000	-2
		175	00011000011100	-4		175	11000110000011	-2
35		176	00011000011001	-4		176	11000110000110	-2
		177	00011000001110	-4		177	11000110001100	-2
		178	00011000000111	-4		178	11000110011000	-2
		179	00011111100000	-2		179	11000111000001	-2
		180	00011111000001	-2		180	11000111100000	-2
		181	00011110011000	-2		181	11001100000011	-2
40		182	00011110001100	-2		182	11001100000110	-2
		183	00011110000110	-2		183	11001100001100	-2
		184	00011110000011	-2		184	11001100011000	-2
		185	00011100111000	-2		185	11001100110000	-2
		186	00011100110001	-2		186	11001110000001	-2
		187	00011100011100	-2		187	11000000011001	-4
		188	00011100011001	-2		188	11000000011100	-4
		189	00011100001110	-2		189	11000000110001	-4
45		190	00011100000111	-2		190	11000000111000	-4
		191	00011001111000	-2		191	11000001100001	-4
		192	00011001110001	-2		192	11000001110000	-4
		193	00011001100110	-2		193	11000011000001	-4
		194	00011001100011	-2		194	11000011100000	-4
		195	00011000111100	-2		195	11000110000001	-4
		196	00011000111001	-2		196	11001100000001	-4
50		197	00011000110011	-2		197	11000000011000	-6
		198	00011000011110	-2		198	11000000110000	-6
		199	00011000001111	-2		199	11000001100000	-6

Table 18 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
3 (c)	200	0001111110000	0	3 (d)	200	11100000001111	0
	201	00011111100001	0		201	11100000001110	0
	202	000111111001100	0		202	111000000110011	0
	203	000111111000110	0		203	111000000111001	0
	204	000111111000011	0		204	111000000111100	0
	205	0001111110011100	0		205	111000011100011	0
	206	0001111110011001	0		206	111000011100110	0
	207	0001111110001110	0		207	111000011110001	0
	208	0001111110000111	0		208	111000011110000	0
	209	000111100111100	0		209	111000110000011	0
4 (c)	210	00011100111001	0	4 (d)	210	11100011000110	0
	211	00011100110011	0		211	11100011001100	0
	212	00011100011110	0		212	11100011100001	0
	213	000111000001111	0		213	11100011110000	0
	214	00011001111100	0		214	11100110000011	0
	215	00011001111001	0		215	11100110000110	0
	216	00011001110011	0		216	11100110001100	0
	217	00011001100111	0		217	11100110011000	0
	218	00011000111110	0		218	11100111000001	0
	219	00011000011111	0		219	11100111100000	0
5 (c)	220	00001111110000	-2	5 (d)	220	11100000001110	-2
	221	000011111100001	-2		221	11100000011001	-2
	222	000011111001100	-2		222	11100000011100	-2
	223	000011111000110	-2		223	111000000110001	-2
	224	000011111000011	-2		224	111000000111000	-2
	225	000011100111100	-2		225	11100001100001	-2
	226	00001110011001	-2		226	11100001110000	-2
	227	00001110001110	-2		227	11100011000001	-2
	228	00001110000111	-2		228	11100011100000	-2
	229	00001100111100	-2		229	11100110000001	-2
6 (c)	230	00001100111001	-2	6 (d)	230	11100000001100	-4
	231	00001100110011	-2		231	11100000011000	-4
	232	00001100011110	-2		232	11100000110000	-4
	233	00001100001111	-2		233	11100001100000	-4
	234	00001111111000	0		234	11110000000111	0
	235	00001111110001	0		235	11110000001110	0
	236	000011111100110	0		236	11110000011001	0
	237	000011111100011	0		237	11110000011100	0
	238	000011111001110	0		238	11110000110001	0
	239	000011111000111	0		239	11110000111000	0
7 (c)	240	00001110011110	0	7 (d)	240	11110001100001	0
	241	00001110001111	0		241	11110001110000	0
	242	00001100111110	0		242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00000111111000	-2		244	11110000000110	-2
	245	00000111110001	-2		245	11110000001100	-2
	246	00000111001110	-2		246	11110000011000	-2
	247	00000111000111	-2		247	11110000110000	-2
	248	00000110001111	-2		248	11110001100000	-2
	249	00000111111100	0		249	11111000000011	0
8 (c)	250	00000111111001	0	8 (d)	250	111110000000110	0
	251	00000111110011	0		251	111110000001100	0
	252	00000111100111	0		252	111110000011000	0
	253	00000111001111	0		253	11111000110000	0
	254	00000110011111	0		254	11111001100000	0
	255	00000011111110	0		255	11111100000001	0

Types of the modulation codes that are allowed to take place according to the end pattern of the preceding modulation code are shown in Table 19.

TABLE 19

End pattern of the preceding modulation codes		Consecutive number of "0" bits at the beginning of modulation code						Consecutive number of "1" bits at the beginning of modulation code					
	CDS $\geq$ 0	1 (A)	2 (A)	3 (A)	4 (A)	5 (A)	6 (A)	1 (B)	2 (B)	3 (B)	4 (B)	5 (B)	6 (B)
	CDS $\leq$ 0	1 (C)	2 (C)	3 (C)	4 (C)	5 (C)	6 (C)	1 (D)	2 (D)	3 (D)	4 (D)	5 (D)	6 (D)
	.....110	o	o	o	o	o	o						
	.....1100	o	o	o	o	o			o	o	o	o	o
	.....11000	o	o	o	o				o	o	o	o	o
	.....110000	o	o	o					o	o	o	o	o
	....1100000	o	o						o	o	o	o	o
	.....001							o	o	o	o	o	o
	.....0011		o	o	o	o	o	o	o	o	o	o	
	.....00111		o	o	o	o	o	o	o	o	o		
	.....001111		o	o	o	o	o	o	o	o			
	....0011111		o	o	o	o	o	o	o				

"o" mark indicates that the modulation codes are allowed.

For example, when the end pattern of the preceding modulation code is "...11000", and the end DSV of the preceding modulation code is -4, the modulation codes of classes 1(A), 2(A), 3(A), 4(A), 2(B), 3(B), 4(B), 5(B) and 6(B) in Table 17 can take place as a current modulation code.

In this case, suppose that the current 8-bit data is "166". Then, one of the two possible modulation codes "00111110011100" (CDS = 2; 2(A)), and "11100011001111" (CDS = 4; 2(B)) is selected: the end DSV at the end of the preceding modulation code and the CDS of the current modulation code are added so as to obtain the end DSV at the end of the current modulation code; the modulation code which will give less DSV is selected, that is, the modulation code "11100011001111" (CDS = 4) is selected. The resultant DSV is 0 and it indicates that the direct current component is removed.

Fig. 3A shows the CNR (carrier-to-noise ratio) characteristics when a sine wave recorded on magnetic tape is reproduced, Fig. 3B shows the power spectrum at the output terminal of the modulator of the embodiment when random 8-bit data are inputted to the modulator, and Fig. 3C shows the power spectrum of the scrambled NRZ at the output terminal of the scrambled NRZ modulator when random 8-bit data are inputted to the scrambled NRZ modulator.

As described above, the embodiment restricts the number of consecutive identical bits in a stream of modulation codes to 2 - 7. As a result, the minimum magnetization transition width is  $1.14T$  ( $= (2 \times 8)T/14$ , where  $T$  is the bit period of the 8-bit data), the maximum magnetization transition width is  $4.00T$  ( $= (7 \times 8)T/14$ ), DR is 1.14 ( $= (2 \times 8)/14$ ), and the ratio of the maximum magnetization transition width to the minimum magnetization transition width is 3.5. Consequently, the bit error rate of the magnetic recording is reduced, and the high-density recording becomes possible. In addition, azimuth recording and high quality over-writing become possible.

Furthermore, the embodiment restricts the absolute value of CDS of the modulation codes equal to or less than 6, allocates up to 4 modulation codes to each 8-bit data according to the DSV at the end of the preceding modulation code and the end pattern of the preceding code, and selects the modulation code the DSV of which gives the least absolute value. As a result, the maximum value of the absolute value of the end DSV can be restricted within 4. Thus, the direct current component can be effectively removed, and hence, the transmission of the modulation codes becomes possible by using a rotary transformer that does not pass the direct current component.

Although specific embodiments of a digital modulation method in accordance with the present invention have been disclosed, it is not intended that the invention be restricted to either the specific configurations or the uses disclosed herein. Modifications may be made in a manner obvious to those skilled in the art. Accordingly, it is intended that the invention be limited only by the scope of the appended claims.

## Claims

1. A digital modulation method for converting 8-bit digital data into 14-bit digital modulation codes, said digital modulation method characterized by comprising:
  - step 1 for selecting up to four 14-bit digital modulation codes for each 8-bit digital data, said 14-bit digital modulation code is selected by the procedures of
    - (a) selecting among the  $2^{14}$  14-bit digital codes, a digital code the numbers of consecutive identical bits in which are 5 or less in the first 6 bits, 2 - 7 from the second bit to 13th bit, and 6 or less in the last 7 bits, the absolute value of CDS (code word digital sum) of the selected digital code being 4 or less, and repeating this selecting procedure,
    - (b) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is 0, and pairing the selected 14-bit digital code with the reversal code thereof to make the 2 digital codes one group, or selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "1", and the value of CDS of which is +2 or +4, combining the selected 14-bit digital codes with the reversal codes thereof, and further combining the two 14-bit digital codes with a pair of 14-bit digital codes selected at the above procedure to make the 4 digital codes one group, and repeating this selecting procedure,
    - (c) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is +2, and another digital code the first bit of which is "1", and the value of CDS of which is +2 or +4, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure,
    - (d) selecting among the selected 14-bit digital codes at the procedure (a), a digital code the first bit of which is "0", and the value of CDS of which is +4, and another digital code the first bit of which is "1", and the value of CDS of which is +2, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure, and
    - (e) selecting 256 groups among the groups formed in the above procedures as the 14-bit digital modulation codes;
  - step 2 for selecting one group of 14-bit digital modulation codes among the 256 groups of the 14-bit digital modulation codes, the selected group corresponding to inputted 8-bit digital data;
  - step 3 for further selecting one or more 14-bit digital modulation codes in the selected group at step 2, each of the 14-bit digital modulation codes satisfying the requirement that the number of consecutive

Identical bits at the joint portion of the preceding 14-bit digital modulation code already selected and the 14-bit digital modulation code to be selected is 2 - 7; and

step 4 for further selecting one 14-bit digital modulation code among the selected modulation codes at step 3 so that said one 14-bit digital modulation code satisfies the requirement that the absolute value of bit DSV (Digital Sum Value) for each bit in the modulation code is equal to or less than 7.

2. A digital modulation method as claimed in claim 1, characterized in that said step 3 comprises the procedures of:

selecting any one of the digital modulation codes the first bits of which are "01", "001", "0001", "00001", and "000001" when the preceding digital modulation code that has already been selected terminates with "10";

selecting any one of the digital modulation codes the first bits of which are "10", "110", "1110", "11110", and "111110" when the preceding digital modulation code that has already been selected terminates with "01";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", "01", "001", "0001", "00001", and "000001" when the preceding digital modulation code that has already been selected terminates with "100";

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", "10", "110", "1110", "11110", and "111110" when the preceding digital modulation code that has already been selected terminates with "011";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", "01", "001", "0001", and "00001" when the preceding digital modulation code that has already been selected terminates with "1000";

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", "10", "110", "1110", and "11110" when the preceding digital modulation code that has already been selected terminates with "0111";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", "01", "001", and "0001" when the preceding digital modulation code that has already been selected terminates with "10000";

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", "10", "110", and "1110" when the preceding digital modulation code that has already been selected terminates with "01111";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", "01", and "001" when the preceding digital modulation code that has already been selected terminates with "100000";

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", "10", and "110" when the preceding digital modulation code that has already been selected terminates with "011111";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", and "01" when the preceding digital modulation code that has already been selected terminates with "1000000"; and

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", and "10" when the preceding digital modulation code that has already been selected terminates with "0111111";

3. A digital modulation method as claimed in claim 1, characterized in that said step 4 comprises the procedures of:

selecting any one of the digital modulation codes the CDS of which are 0, -2 and -4, when the DSV at the end of the preceding 14-bit digital modulation code that has already been selected is +2;

selecting any one of the digital modulation codes the CDS of which are +2, 0 and -2, when the DSV at the end of the preceding 14-bit digital modulation code that has already been selected is 0; and

selecting any one of the digital modulation codes the CDS of which are +4, +2, and 0 when the DSV at the end of the preceding 14-bit digital modulation code that has already been selected is -2;

4. A digital modulation method as claimed in claim 1, characterized in that said digital modulation codes obtained at step 1 are the codes described in the following Tables 4 and 5, or the codes obtained by substituting a part of Table 4 by the following Table 12, or the codes obtained by substituting a part of Table 5 by the following Table 13.

Table 4 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	0	01111110000001	0		0	10000001111110	0
	1	011111100110000	0		1	10000011001111	0
	2	011111100011000	0		2	10000011100111	0
	3	011111100001100	0		3	10000011110011	0
	4	011111100000110	0		4	10000011111001	0
	5	011111100000011	0		5	10000011111100	0
10	6	011110011100000	0		6	10000110001111	0
	7	011110011000001	0		7	10000110011110	0
	8	011110001110000	0		8	10000111000111	0
	9	011110001100001	0		9	10000111001110	0
	10	011110000111000	0		10	10000111100011	0
	11	011110000100011	0		11	10000111100110	0
	12	011110000011100	0		12	10000111110001	0
15	13	011110000000111	0		13	10000111111000	0
	14	011100111100000	0		14	10001100001111	0
	15	011100111000001	0		15	10001100011110	0
	16	011100110011000	0		16	10001100110011	0
	17	011100110001100	0		17	10001100111001	0
	18	011100110000111	0		18	10001100111100	0
20	19	011100011110000	0		19	10001110000111	0
	20	011100011100001	0		20	10001110001110	0
	21	011100011001100	0		21	10001110011001	0
	22	011100011000111	0		22	10001110011100	0
	23	011100001111000	0		23	10001111000011	0
	24	011100001110001	0		24	10001111000110	0
25	25	011100001100111	0		25	10001111001100	0
	26	011100000111100	0		26	10001111100001	0
	27	011100000011111	0		27	10001111110000	0
	28	011001111100000	0		28	10011000001111	0
	29	011001111000001	0		29	10011000011110	0
	30	011001110011000	0		30	10011000110011	0
30	31	011001110001100	0		31	10011000111001	0
	32	011001110000111	0		32	10011000111100	0
	33	011001100111000	0		33	10011001100011	0
	34	011001100110001	0	1(B)	34	10011001100110	0
	35	011001100011100	0		35	10011001110001	0
	36	011001100001111	0		36	10011001111000	0
	37	011000111110000	0		37	10011100000111	0
35	38	011000111100001	0		38	10011100001110	0
	39	011000111001100	0		39	10011100011001	0
	40	011000111000111	0		40	10011100011100	0
	41	011000110011100	0		41	10011100110001	0
	42	011000110001100	0		42	10011100111000	0
	43	011000011111000	0		43	10011110000011	0
40	44	011000011110001	0		44	10011110000110	0
	45	011000011100011	0		45	10011110001100	0
	46	011000011001100	0		46	10011110011000	0
	47	011000001111100	0		47	10011111000001	0
	48	011000000111111	0		48	10011111100000	0
	49	011111110011000	4		49	10000011111110	2
45	50	011111110001100	4		50	10000110011111	2
	51	011111110000111	4		51	10000111001111	2
	52	011111110011100	4		52	10000111100111	2
	53	011111110011001	4		53	10000111110011	2
	54	011111110001110	4		54	10000111111001	2
	55	011111110000111	4		55	10000111111100	2
50	56	011111100111100	4		56	10001100011111	2
	57	011111100111001	4		57	10001100111110	2
	58	011111100110011	4		58	10001110001111	2
	59	011111100011110	4		59	10001110011110	2
	60	011111100001111	4		60	10001111000111	2
	61	011111001111100	4		61	10001111001110	2
55	62	01111001111001	4		62	10001111100011	2
	63	01111001110011	4		63	10001111110010	2

Table 4 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	64	01111001100111	4		64	10001111110001	2
	65	01111000111110	4		65	10001111111000	2
	66	01111000011111	4		66	10011000011111	2
	67	01110011111100	4		67	10011000111110	2
	68	01110011111001	4		68	10011001100111	2
	69	01110011110011	4		69	10011001110011	2
10	70	01110011100111	4		70	10011001111001	2
	71	01110011001111	4		71	10011001111100	2
	72	01110001111110	4		72	10011100001111	2
	73	01110000111111	4		73	10011100011110	2
	74	01100111111100	4		74	10011100110011	2
	75	01100111111001	4		75	10011100111001	2
15	76	01100111110011	4		76	10011100111100	2
	77	01100111100111	4		77	10011110000111	2
	78	01100111001111	4		78	10011110001110	2
	79	01100110011111	4	1(B)	79	10011110011001	2
	80	01100011111110	4		80	10011110011100	2
	81	01111111000001	2		81	10011111000011	2
20	82	01111110011000	2		82	10011111000110	2
	83	01111110001100	2		83	10011111001100	2
	84	01111110000110	2		84	10011111000011	2
	85	01111110000011	2		85	10011111100000	2
	86	01111100111000	2		86	10001111001111	4
	87	01111100110001	2		87	10001111100111	4
	88	01111100011100	2		88	10001111110011	4
25	89	01111100011001	2		89	10011001111110	4
	90	01111100001110	2		90	10011100111110	4
	91	01111100000111	2		91	10011110001111	4
	92	01111001111000	2		92	10011110011110	4
	93	01111001110001	2		93	10011111000111	4
	94	01111001100110	2		94	10011111001110	4
30	95	01111001100011	2		95	10011111100011	4
	96	01111000111100	2		96	10011111100110	4
1(A)	97	01111000111001	2		97	11000111100111	4
	98	01111000110011	2		98	11000111110011	4
	99	01111000011110	2		99	11000000111111	2
	100	01111000001111	2		100	11000001111110	2
35	101	01110011111000	2		101	11000011001111	2
	102	01110011110001	2		102	11000011100111	2
	103	01110011100110	2		103	11000011110011	2
	104	01110011100011	2		104	11000011111001	2
	105	01110011001110	2		105	11000011111100	2
	106	01110011000111	2		106	11000110001111	2
40	107	01110001111100	2		107	11000110011110	2
	108	01110001111001	2	2(B)	108	11000111000111	2
	109	01110001110011	2		109	11000111001110	2
	110	01110001100111	2		110	11000111000111	2
	111	01110000111110	2		111	11000111100110	2
	112	01110000011111	2		112	11000111110001	2
	113	01100111111000	2		113	11000111111000	2
45	114	01100111110001	2		114	11001100001111	2
	115	01100111100110	2		115	11001100011110	2
	116	01100111100011	2		116	11001100110011	2
	117	01100111001110	2		117	11001100111001	2
	118	01100111000111	2		118	11001100111100	2
	119	01100110011110	2		119	11001110000111	2
50	120	01100110001111	2		120	11001110001110	2
	121	01100011111100	2		121	11001110011001	2
	122	01100011111001	2		122	11001110011100	2
	123	01100011110011	2		123	11001111000011	2
	124	01100011100111	2		124	11001111000110	2
	125	01100011001111	2		125	11001111001100	2
55	126	01100001111110	2		126	11001111100001	2
	127	01100000111111	2		127	11001111110000	2

Table 4 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	128	00111111100000	0		128	11000000011111	0
	129	00111111100001	0		129	11000000111110	0
	130	001111110011000	0		130	11000001100111	0
	131	001111110001100	0		131	11000001110011	0
	132	001111110000110	0		132	11000001111001	0
	133	001111110000011	0		133	11000001111100	0
10	134	001111100111000	0		134	11000011000111	0
	135	001111100110001	0		135	11000011001110	0
	136	001111100011100	0		136	11000011100011	0
	137	001111100011001	0		137	11000011100110	0
	138	001111100001110	0		138	11000011110001	0
	139	001111100000111	0		139	11000011111000	0
15	140	00111001111000	0		140	11000110000111	0
	141	00111001110001	0		141	11000110001110	0
	142	001110011001110	0		142	11000110011001	0
	143	001110011000111	0	2(B)	143	11000110011100	0
	144	00111000111100	0		144	11000111000011	0
	145	0011100011001	0		145	11000111000110	0
	146	00111000110011	0		146	11000111001100	0
20	147	00111000011110	0		147	11000111100001	0
	148	00111000001111	0		148	11000111110000	0
	149	00110011111000	0		149	11001100000111	0
	150	00110011110001	0		150	11001100001110	0
	151	00110011100110	0		151	11001100011001	0
25	152	00110011100011	0		152	11001100011100	0
	153	00110011001110	0		153	11001100110001	0
	154	00110011000111	0		154	11001100111000	0
	155	00110001111100	0		155	11001110000011	0
	156	00110001111001	0		156	11001110000110	0
	157	00110001110011	0		157	11001110001100	0
	158	00110001100111	0		158	11001110011000	0
30	159	00110000111110	0		159	11001111000001	0
	160	00110000011111	0		160	11001111100000	0
	161	00111111100001	2		161	11001100111110	4
	162	001111111001100	2		162	11001110011110	4
	163	001111111000110	2		163	11001111000111	4
	164	001111111000011	2		164	11001111001110	4
35	165	001111110011100	2		165	11001111100011	4
	166	001111110011001	2		166	11001111100110	4
	167	001111110001110	2		167	11100001111110	4
	168	001111110000111	2		168	11100011100111	4
	169	001111100111100	2		169	11100011110011	4
	170	00111110011001	2		170	11100011111000	4
40	171	001111100110011	2		171	11100110011110	4
	172	001111100011110	2	3(B)	172	11100111000111	4
	173	001111100001111	2		173	11100111001110	4
	174	00111001111100	2		174	11100111100011	4
	175	00111001111001	2		175	11100111100110	4
	176	00111001110011	2		176	11100111110000	4
	177	00111001100111	2		177	11100000011111	2
45	178	00111000111110	2		178	11100000111110	2
	179	00111000011111	2		179	11100001100111	2
	180	00110011111100	2		180	11100001110011	2
	181	00110011111001	2		181	11100001111001	2
	182	00110011110011	2		182	11100001111100	2
	183	00110011100111	2		183	11100011000111	2
50	184	00110011001111	2		184	11100011001110	2
	185	00110001111110	2		185	11100011100011	2
	186	00110000111111	2		186	11100011100110	2
	187	00111111100110	4		187	11100011110001	2
	188	00111111100011	4		188	11100011111000	2
	189	00111111001110	4		189	11100110000111	2
55	190	00111111000111	4		190	11100110001110	2
	191	00111110011110	4		191	11100110011001	2



Table 4 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
2(A)	192	00111110001111	4		192	11100110011100	2
	193	00111110011110	4		193	11100111000011	2
	194	00111110001111	4		194	11100111000110	2
	195	00111001111110	4		195	11100111001100	2
	196	00111000111111	4		196	11100111100001	2
	197	00110011111110	4		197	11100111110000	2
3(A)	198	00011111110000	0	3(B)	198	11100000001111	0
	199	000111111100001	0		199	11100000011110	0
	200	00011111001100	0		200	11100000110011	0
	201	00011111000110	0		201	11100000111001	0
	202	00011111000011	0		202	11100000111100	0
	203	00011110011100	0		203	11100001100011	0
	204	00011110011001	0		204	11100001100110	0
	205	00011110001110	0		205	11100001110001	0
	206	00011110000111	0		206	11100001111000	0
	207	00011100111100	0		207	11100011000011	0
	208	00011100111001	0		208	11100011000110	0
	209	00011100110011	0		209	11100011001100	0
	210	00011100011110	0		210	11100011100001	0
	211	00011100001111	0		211	11100011110000	0
	212	00011001111100	0		212	11100110000011	0
	213	00011001111001	0		213	11100110000110	0
	214	00011001110011	0		214	11100110001100	0
	215	00011001100111	0		215	11100110011000	0
	216	00011000111110	0		216	11100111000001	0
	217	00011000011111	0		217	11100111100000	0
	218	00011111110001	2	4(B)	218	11110001111100	4
	219	00011111110010	2		219	11110011111000	4
	220	00011111110001	2		220	11110000001111	2
	221	00011111001110	2		221	11110000011110	2
	222	00011111000111	2		222	11110000110011	2
	223	00011110011110	2		223	11110000111001	2
	224	00011110001111	2		224	11110000111100	2
	225	00011100111110	2		225	11110001100011	2
	226	00011100011111	2		226	11110001100110	2
	227	00011001111110	2		227	11110001110001	2
	228	00011000111111	2		228	11110001111000	2
	229	00011111110011	4		229	11110011000011	2
	230	00011111001111	4		230	11110011000110	2
	231	00011111001111	4		231	11110011001100	2
	232	00011110011111	4		232	11110011100001	2
	233	00011100111111	4		233	11110011110000	2
4(A)	234	00001111111000	0	5(B)	234	11110000000111	0
	235	000011111110001	0		235	11110000001110	0
	236	00001111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	00001111001110	0		238	11110000110001	0
	239	00001111000111	0		239	11110000111000	0
	240	00001110011110	0		240	11110001100001	0
	241	00001110001111	0		241	11110001110000	0
	242	00001100111110	0		242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00001111111001	2		244	11111000000111	2
	245	00001111110011	2		245	11111000001110	2
	246	00001111100111	2		246	11111000011001	2
	247	00001111001111	2		247	11111000011100	2
	248	00001110011111	2		248	11111000111000	2
	249	00001100111111	2		249	11111001110000	2
5(A)	250	00000111111100	0		250	11111000000011	0
	251	00000111111001	0		251	11111000000110	0
	252	00000111110011	0		252	11111000001100	0
	253	00000111100111	0		253	11111000011000	0
	254	00000111001111	0		254	11111000110000	0
	255	00000110011111	0		255	11111001100000	0

Table 5 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	0	01111110000001	0		0	10000001111110	0
	1	01111100110000	0		1	10000011001111	0
	2	01111100011000	0		2	10000011100111	0
	3	01111100001100	0		3	10000011110011	0
	4	01111100000110	0		4	10000011111001	0
	5	01111100000011	0		5	10000011111100	0
10	6	01111001110000	0		6	10000110001111	0
	7	01111001100001	0		7	10000110011110	0
	8	01111000111000	0		8	10000111000111	0
	9	01111000110001	0		9	10000111001110	0
	10	01111000011100	0		10	10000111100011	0
	11	01111000011001	0		11	10000111100110	0
15	12	01111000001110	0		12	10000111110001	0
	13	01111000001111	0		13	10000111111000	0
	14	01110011110000	0		14	10001100001111	0
	15	01110011100001	0		15	10001100011110	0
	16	01110011001100	0		16	10001100110011	0
	17	01110011000110	0		17	10001100111001	0
20	18	01110011000011	0		18	10001100111100	0
	19	01110001111000	0		19	10001110000011	0
	20	01110001110001	0		20	10001110001110	0
	21	01110001100110	0		21	10001110011001	0
	22	01110001100011	0		22	10001110011100	0
	23	01110000111100	0		23	10001111000011	0
	24	01110000111001	0		24	10001111000110	0
25	25	01110000110011	0		25	10001111001100	0
	26	01110000011110	0		26	10001111100001	0
	27	01110000001111	0		27	10001111100000	0
	28	01100111110000	0		28	10011000001111	0
	29	01100111100001	0		29	10011000011110	0
	30	01100111001100	0		30	10011000110011	0
30	31	01100111000110	0		31	10011000111001	0
	32	01100111000011	0		32	10011000111100	0
	33	01100110011100	0		33	10011001100011	0
	34	01100110011001	0	1(D)	34	10011001100110	0
	35	01100110001110	0		35	10011001110001	0
	36	01100110000111	0		36	10011001111000	0
35	37	01100011111000	0		37	10011100000111	0
	38	01100011110001	0		38	10011100001110	0
	39	01100011100110	0		39	10011100011001	0
	40	01100011100011	0		40	10011100011100	0
	41	01100011001110	0		41	10011100110001	0
	42	01100011000111	0		42	10011100111000	0
40	43	01100001111100	0		43	10011110000011	0
	44	01100001111001	0		44	10011110000110	0
	45	01100001110011	0		45	10011110001100	0
	46	01100001100111	0		46	10011110011000	0
	47	01100000111110	0		47	10011111000001	0
	48	01100000011111	0		48	10011111100000	0
45	49	01111100000001	-2		49	10000000110011	-4
	50	01111001100000	-2		50	10000000111001	-4
	51	01111000110000	-2		51	10000000111100	-4
	52	01111000011000	-2		52	10000001100011	-4
	53	01111000001100	-2		53	10000001100110	-4
	54	01111000000110	-2		54	10000001110001	-4
	55	01111000000011	-2		55	10000001111000	-4
50	56	01110011100000	-2		56	10000011000011	-4
	57	01110011000001	-2		57	10000011000110	-4
	58	01110001110000	-2		58	10000011001100	-4
	59	01110001100001	-2		59	10000011100001	-4
	60	01110000111000	-2		60	10000011110000	-4
	61	01110000110001	-2		61	10000110000011	-4
55	62	01110000011100	-2		62	10000110000110	-4
	63	01110000011001	-2		63	10000110001100	-4

Table 5 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	64	01110000001110	-2		64	10000110011000	-4
	65	01110000000111	-2		65	10000111000001	-4
	66	01100111100000	-2		66	10000111100000	-4
	67	01100111000001	-2		67	10001100000011	-4
	68	01100110011000	-2		68	10001100000110	-4
	69	01100110001100	-2		69	10001100001100	-4
10	70	01100110000110	-2		70	10001100011000	-4
	71	01100110000011	-2		71	10001100110000	-4
	72	01100011110000	-2		72	10001110000001	-4
	73	01100011100001	-2		73	10001111000000	-4
	74	01100011001100	-2		74	10011000000011	-4
	75	01100011000110	-2		75	10011000000110	-4
15	76	01100011000011	-2		76	10011000001100	-4
	77	01100001111000	-2		77	10011000011000	-4
	78	01100001110001	-2		78	10011000110000	-4
	79	01100001100110	-2		79	10011001100000	-4
	80	01100001100011	-2		80	10011100000001	-4
	81	01100000111100	-2		81	10000000111110	-2
20	82	01100000111001	-2		82	10000001100111	-2
	83	01100000110011	-2		83	10000001110011	-2
	84	01100000011110	-2		84	10000001111001	-2
	85	01100000011111	-2		85	10000001111100	-2
	86	01110000110000	-4		86	10000011000111	-2
	87	01110000011000	-4		87	10000011001110	-2
	88	01110000001100	-4		88	10000011100011	-2
25	89	01100110000001	-4		89	10000011100110	-2
	90	01100011000001	-4		90	10000011110001	-2
	91	01100001110000	-4		91	10000011111000	-2
	92	01100001100001	-4		92	10000110000111	-2
	93	01100000111000	-4		93	10000110001110	-2
	94	01100000110001	-4		94	10000110011001	-2
30	95	01100000011100	-4		95	10000110011100	-2
	96	01100000011001	-4		96	10000111000011	-2
	97	00111000011000	-4	1(D)	97	10000111000110	-2
	98	00111000001100	-4		98	10000111001100	-2
	99	00111111000000	-2		99	10000111100001	-2
	100	00111110000001	-2		100	10000111110000	-2
35	101	00111100110000	-2		101	10001100000111	-2
	102	00111100011000	-2		102	10001100001110	-2
	103	00111100001100	-2		103	10001100011001	-2
	104	00111100000110	-2		104	10001100011100	-2
	105	00111100000011	-2		105	10001100110001	-2
	106	00111001110000	-2		106	10001100111000	-2
40	107	00111001100001	-2		107	10001110000011	-2
	108	00111000111000	-2		108	10001110000110	-2
	109	00111000110001	-2		109	10001110001100	-2
	110	00111000011100	-2		110	10001110011000	-2
	111	00111000011001	-2		111	10001111000001	-2
	112	00111000001110	-2		112	10001111100000	-2
	113	00111000000111	-2		113	10011000000111	-2
45	114	00110011110000	-2		114	10011000001110	-2
	115	00110011100001	-2		115	10011000011001	-2
	116	00110011001100	-2		116	10011000011100	-2
	117	00110011000110	-2		117	10011000110001	-2
	118	00110011000011	-2		118	10011000111000	-2
	119	00110001111000	-2		119	10011001100001	-2
50	120	00110001110001	-2		120	10011001110000	-2
	121	00110001100110	-2		121	10011100000011	-2
	122	00110001100011	-2		122	10011100000110	-2
	123	00110000111100	-2		123	10011100001100	-2
	124	00110000111001	-2		124	10011100011000	-2
	125	00110000110011	-2		125	10011100110000	-2
55	126	00110000011110	-2		126	10011110000001	-2
	127	00110000001111	-2		127	10011111000000	-2

Table 5 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	128	0011111100000	0		128	11000000011111	0
	129	00111111000001	0		129	11000000111110	0
	130	00111110011000	0		130	11000001100111	0
	131	00111110001100	0		131	11000001110011	0
	132	00111110000110	0		132	11000001111001	0
	133	00111110000011	0		133	11000001111100	0
10	134	00111100111000	0		134	11000011000111	0
	135	00111100110001	0		135	11000011001110	0
	136	00111100011100	0		136	11000011100011	0
	137	00111100011001	0		137	11000011100110	0
	138	00111100001110	0		138	11000011110001	0
	139	00111100000111	0		139	11000011111000	0
15	140	00111001111000	0		140	11000110000111	0
	141	00111001110001	0		141	11000110001110	0
	142	00111001100110	0		142	11000110011001	0
	143	00111001100011	0		143	11000110011100	0
	144	00111000111100	0		144	11000111000011	0
	145	00111000111001	0		145	11000111000110	0
	146	00111000110011	0		146	11000111001100	0
20	147	00111000011110	0		147	11000111100001	0
	148	00111000001111	0		148	11000111110000	0
	149	00110011111000	0		149	11001100000111	0
	150	00110011110001	0		150	11001100001110	0
	151	00110011100110	0		151	11001100011001	0
	152	00110011100011	0		152	11001100011100	0
25	153	00110011001110	0		153	11001100110001	0
	154	00110011000111	0		154	11001100111000	0
	155	00110001111100	0		155	11001110000011	0
	156	00110001111001	0		156	11001110000110	0
	157	00110001110011	0		157	11001110001100	0
	158	00110001100111	0		158	11001110011000	0
30	159	00110000111110	0		159	11001111000001	0
	160	00110000011111	0		160	11001111000000	0
	161	00110011000001	-4	2(D)	161	11000000011110	-2
	162	00110001100001	-4		162	11000000110011	-2
	163	00110000111000	-4		163	11000000111001	-2
	164	00110000110001	-4		164	11000000111100	-2
	165	00110000011100	-4		165	11000001100011	-2
35	166	00110000011001	-4		166	11000001100110	-2
	167	00011110000001	-4		167	11000001110001	-2
	168	000111100011000	-4		168	11000001111000	-2
	169	000111000011100	-4		169	11000011000011	-2
	170	00011100000011	-4		170	11000011000110	-2
	171	00011001100001	-4		171	11000011001100	-2
40	172	000110001111000	-4		172	11000011100001	-2
	173	00011000110001	-4		173	11000011110000	-2
	174	00011000011100	-4		174	11000110000011	-2
	175	00011000011001	-4		175	11000110000110	-2
	176	00011000000111	-4		176	11000110001100	-2
	177	00011111000000	-2		177	11000110011000	-2
45	178	00011111000001	-2		178	11000111000001	-2
	179	00011110011000	-2		179	11000111100000	-2
	180	00011110001100	-2		180	11001100000011	-2
	181	00011110000110	-2		181	11001100000110	-2
	182	00011110000011	-2		182	11001100001100	-2
	183	00011100111000	-2		183	11001100011000	-2
50	184	00011100110001	-2		184	11001100110000	-2
	185	00011100011100	-2		185	11001110000001	-2
	186	00011100011001	-2		186	11001111000000	-2
	187	00011100001110	-2		187	11000000011001	-4
	188	00011100000111	-2		188	11000000011100	-4
	189	00011001111000	-2		189	11000000110001	-4
55	190	00011001110001	-2		190	11000000111000	-4
	191	00011001100110	-2		191	11000001100001	-4

Table 5 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
6	192	00011001100011	-2	2(D)	192	11000001110000	-4
	193	00011000111100	-2		193	11000011000001	-4
	194	00011000111001	-2		194	11000011100000	-4
	195	00011000110011	-2		195	11000110000001	-4
	196	00011000011110	-2		196	11000111000000	-4
	197	00011000001111	-2		197	11001100000001	-4
	198	00011111110000	0	3(D)	198	11100000001111	0
10	199	00011111100001	0		199	11100000011110	0
	200	00011111001100	0		200	11100000110011	0
	201	00011111000110	0		201	11100000111001	0
	202	00011111000011	0		202	11100000111100	0
	203	00011110011100	0		203	11100001100011	0
	204	00011110011001	0		204	11100001100110	0
	205	00011110001110	0		205	11100001110001	0
15	206	00011110000111	0		206	11100001111000	0
	207	00011100111100	0		207	11100011000011	0
	208	00011100111001	0		208	11100011000110	0
	209	00011100110011	0		209	11100011001100	0
	210	00011100011110	0		210	11100011100001	0
	211	00011100001111	0		211	11100011110000	0
	212	00011001111100	0		212	11100110000011	0
20	213	00011001111001	0		213	11100110000110	0
	214	00011001110011	0		214	11100110001100	0
	215	00011001100111	0		215	11100110011000	0
	216	00011000111110	0		216	11100111000001	0
	217	00011000011111	0		217	11100111100000	0
	218	00001110000011	-4		218	11100000001110	-2
	219	00001100000011	-4		219	11100000011001	-2
25	220	00001111110000	-2		220	11100000011100	-2
	221	00001111100001	-2		221	11100000110001	-2
	222	00001111001100	-2		222	11100000111000	-2
	223	00001111000110	-2		223	11100001100001	-2
	224	00001111000011	-2		224	11100001110000	-2
	225	00001110011100	-2		225	11100011000001	-2
	226	00001110011001	-2		226	11100011100000	-2
30	227	00001110001110	-2		227	11100110000001	-2
	228	00001110000111	-2		228	11100111000000	-2
	229	00001100111100	-2		229	11100000001100	-4
	230	00001100111001	-2		230	11100000011000	-4
	231	00001100110011	-2		231	11100000110000	-4
	232	00001100011110	-2		232	11100001100000	-4
	233	00001100001111	-2		233	11100011000000	-4
35	234	00001111111000	0	4(D)	234	11110000000111	0
	235	00001111110001	0		235	11110000001110	0
	236	00001111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	00001111001110	0		238	11110000110001	0
	239	00001111000111	0		239	11110000111000	0
	240	00001110011110	0		240	11110001100001	0
40	241	00001110001111	0		241	11110001110000	0
	242	00001100111110	0		242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00000111111000	-2		244	11110000000110	-2
	245	00000111110001	-2		245	11110000001100	-2
	246	00000111100110	-2		246	11110000011000	-2
	247	00000111100011	-2		247	11110000110000	-2
45	248	00000111000111	-2		248	11110001100000	-2
	249	00000110001111	-2		249	11110011000000	-2
	250	00000111111000	0	5(D)	250	11111000000011	0
	251	00000111111001	0		251	11111000000010	0
	252	00000111110011	0		252	11111000001100	0
	253	00000111100111	0		253	11111000011000	0
	254	00000111001111	0		254	11111000110000	0
	255	00000110011111	0		255	11111001100000	0
50							
55							

TABLE 12

8-bit data	Modulation codes	CDS
248	11111000110001	2
249	11111000111000	2
250	11111001100001	2
251	11111001110000	2

TABLE 13

8-bit data	Modulation codes	CDS
248	00000111001110	-2
249	00000111000111	-2
250	00000110011110	-2
251	00000110001111	-2

5. A digital modulation method for converting 8-bit digital data into 14-bit digital modulation codes, said digital modulation method comprising:

step 1 for selecting up to four 14-bit digital modulation codes for each 8-bit digital data, said 14-bit digital modulation code is selected by the procedures of

(a) selecting among the  $2^{14}$  14-bit digital codes, a digital code the numbers of consecutive identical bits in which are 6 or less in the first 7 bits, 2 - 7 from the second bit to 13th bit, and 5 or less in the last 6 bits, and repeating this selecting procedure,

(b) selecting among the 14-bit digital codes selected at the procedure (a), a digital code the first bit of which is "0", and the CDS of which has the absolute value equal to or less than 6, and repeating this selecting procedure,

(c) selecting among the 14-bit digital codes selected at the procedure (a), a digital code the first bit of which is "1", and the CDS of which has the absolute value equal to or less than 4, and repeating this selecting procedure,

(d) selecting among the 14-bit digital codes selected at the procedure (b), a digital code the value of CDS of which is 0, and pairing the selected 14-bit digital code with the reversal code thereof to make the 2 digital codes one group, and repeating this selecting procedure,

(e) selecting among the 14-bit digital codes selected at the procedure (b), a digital code the value of CDS of which is +2, +4 or +6, selecting among the 14-bit digital codes selected at the procedure

(c), a digital code the value of CDS of which is +2 or +4, and combining the two selected 14-bit digital codes with the reversal codes thereof to make the 4 digital codes one group, and repeating this selecting procedure, and

(f) selecting 256 groups among the groups formed in the above procedures as the 14-bit digital modulation codes;

step 2 for selecting one group of 14-bit digital modulation codes among the 256 groups of the 14-bit digital modulation codes, said selected group corresponding to inputted 8-bit digital data;

step 3 for further selecting one or more 14-bit digital modulation codes in the selected group at step 2, each of the 14-bit digital modulation codes satisfying the requirement that the number of consecutive identical bits at the joint portion of the preceding 14-bit digital modulation code already selected and the 14-bit digital modulation code to be selected is 2 - 7; and

step 4 for further selecting one 14-bit digital modulation code among the selected modulation codes at step 3 so that said one 14-bit digital modulation code satisfies the requirement that the absolute value of bit DSV for each bit in the modulation code is equal to or less than 8.

6. A digital modulation method as claimed in claim 5, wherein said step 3 comprises the procedures of:

selecting any one of the digital modulation codes the first bits of which are "01", "001", "0001", "00001", "000001", and "0000001" when the preceding digital modulation code that has already been selected terminates with "10";

selecting any one of the digital modulation codes the first bits of which are "10", "110", "1110", "11110", "111110", and "1111110" when the preceding digital modulation code that has already been selected terminates with "01";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", "1111110", "01", "001", "0001", "00001", and "000001" when the preceding digital modulation code that has already been selected terminates with "100";

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", "0000001", "10", "110", "1110", "11110", and "111110" when the preceding digital modulation code that has already been selected terminates with "011";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", "1111110", "01", "001", "0001", and "00001" when the preceding digital modulation code that has already been selected terminates with "1000";

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", "0000001", "10", "110", "1110", and "11110" when the preceding digital modulation code that has already been selected terminates with "0111";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", "1111110", "01", "001", and "0001" when the preceding digital modulation code that has already been selected terminates with "10000";

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", "0000001", "10", "110", and "1110" when the preceding digital modulation code that has already been selected terminates with "01111";

selecting any one of the digital modulation codes the first bits of which are "110", "1110", "11110", "111110", "1111110", "01", and "001" when the preceding digital modulation code that has already been selected terminates with "100000"; and

selecting any one of the digital modulation codes the first bits of which are "001", "0001", "00001", "000001", "0000001", "10", and "110" when the preceding digital modulation code that has already been selected terminates with "011111".

7. A digital modulation method as claimed in claim 5, wherein said step 4 comprises the procedures of:

selecting any one of the digital modulation codes the CDS of which are 0, -2, -4, and -6 when the DSV at the end of the preceding 14-bit digital modulation code that has already been selected is +4 or +2;

selecting any one of the digital modulation codes the CDS of which are +4, +2, 0, -2, and -4 when the DSV at the end of the preceding 14-bit digital modulation code that has already been selected is 0; and

selecting any one of the digital modulation codes the CDS of which are +6, +4, +2, and 0 when the DSV at the end of the preceding 14-bit digital modulation code that has already been selected is -2 or -4;

8. A digital modulation method as claimed in claim 5, wherein said digital modulation codes are the codes described in the following Tables 17 and 18.

Table 17 (CDS  $\geq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
0	0	0111110000001	0	0	0	1000000111110	0
1	1	01111100110000	0	1	1	10000011001111	0
2	2	01111100011000	0	2	2	10000011100111	0
3	3	01111100001100	0	3	3	10000011110011	0
4	4	011111000000110	0	4	4	10000011111001	0
5	5	011111000000011	0	5	5	10000011111100	0
6	6	01111001110000	0	6	6	10000110001111	0
7	7	01111001100001	0	7	7	10000110011110	0
8	8	01111000111000	0	8	8	10000111000111	0
9	9	01111000110001	0	9	9	10000111001110	0
10	10	01111000011100	0	10	10	10000111100011	0
11	11	01111000011001	0	11	11	10000111100110	0
12	12	01111000001110	0	12	12	10000111110001	0
13	13	011110000000111	0	13	13	10000111111000	0
14	14	01110011110000	0	14	14	10001100001111	0
15	15	01110011100001	0	15	15	10001100011110	0
16	16	01110011001100	0	16	16	10001100110011	0
17	17	01110011000110	0	17	17	10001100111001	0
18	18	01110011000011	0	18	18	10001100111100	0
19	19	01110001111000	0	19	19	10001110000111	0
20	20	01110001110001	0	20	20	10001110001110	0
21	21	01110001100110	0	21	21	10001110011001	0
22	22	01110001100011	0	22	22	10001110011100	0
23	23	01110000111100	0	23	23	10001111000011	0
24	24	01110000111001	0	24	24	10001111000110	0
25	25	01110000110011	0	25	25	10001111001100	0
26	26	01110000011110	0	26	26	10001111100001	0
27	27	01110000001111	0	27	27	10001111110000	0
28	28	01100111110000	0	28	28	10011000001111	0
29	29	01100111100001	0	29	29	10011000011110	0
30	30	01100111001100	0	30	30	10011000110011	0
31	31	01100111000110	0	31	31	10011000111001	0
32	32	01100111000011	0	32	32	10011000111100	0
33	33	01100110011100	0	33	33	10011001100011	0
34	34	01100110011001	0	34	34	10011001100110	0
35	35	01100110001110	0	35	35	10011001110001	0
36	36	01100110000111	0	36	36	10011001111000	0
37	37	01100011111000	0	37	37	10011100000111	0
38	38	01100011110001	0	38	38	10011100001110	0
39	39	01100011100110	0	39	39	10011100011001	0
40	40	01100011100011	0	40	40	10011100011100	0
41	41	01100011001110	0	41	41	10011100110001	0
42	42	01100011000111	0	42	42	10011100111000	0
43	43	01100001111100	0	43	43	10011110000011	0
44	44	01100001111001	0	44	44	10011110000110	0
45	45	01100001110011	0	45	45	10011110001100	0
46	46	01100001100111	0	46	46	10011110011000	0
47	47	01100000111110	0	47	47	10011111000001	0
48	48	01100000011111	0	48	48	10011111100000	0
49	49	01111111000001	2	49	49	10000011111110	2
50	50	01111110011000	2	50	50	10000110011111	2
51	51	01111110001100	2	51	51	10000111001111	2
52	52	01111110000110	2	52	52	10000111100111	2
53	53	01111110000011	2	53	53	10000111110011	2
54	54	01111100111000	2	54	54	10000111111001	2
55	55	01111100110001	2	55	55	10000111111100	2
56	56	01111100011100	2	56	56	10001100011111	2
57	57	01111100011001	2	57	57	10001100111110	2
58	58	01111100001110	2	58	58	10001110001111	2
59	59	01111100000111	2	59	59	10001110011110	2
60	60	01111001111000	2	60	60	10001111000111	2
61	61	01111001110001	2	61	61	10001111001110	2
62	62	01111001100110	2	62	62	10001111100011	2
63	63	01111001100011	2	63	63	10001111100110	2
64	64	01111000111100	2	64	64	10001111110001	2
65	65	01111000111001	2	65	65	10001111111000	2
66	66	01111000110011	2	66	66	10011000011111	2



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Table 17 (CDS  $\geq 0$ )

	Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	2 (A)	134	00111110000011	0	2 (B)	134	11000001111100	0
		135	001111100111000	0		135	11000011000111	0
		136	001111100110001	0		136	11000011001110	0
		137	001111100011100	0		137	11000011100011	0
		138	001111100011001	0		138	11000011100110	0
10		139	001111100001110	0		139	11000011110001	0
		140	001111100000111	0		140	11000011111000	0
		141	001110011111000	0		141	11000110000111	0
		142	00111001110001	0		142	11000110001110	0
		143	00111001100110	0		143	11000110011001	0
		144	00111001100011	0		144	11000110011100	0
		145	00111000111100	0		145	11000111000011	0
		146	00111000111001	0		146	11000111000110	0
15		147	00111000110011	0		147	11000111001100	0
		148	00111000011110	0		148	11000111100001	0
		149	00111000001111	0		149	11000111110000	0
		150	001100111111000	0		150	11001100000111	0
		151	00110011110001	0		151	11001100001110	0
		152	00110011100110	0		152	11001100011001	0
		153	00110011100011	0		153	11001100011100	0
20		154	00110011001110	0		154	11001100110001	0
		155	00110011000111	0		155	11001100111000	0
		156	00110001111100	0		156	11001110000011	0
		157	00110001111001	0		157	11001110000110	0
		158	00110001110011	0		158	11001110001100	0
		159	00110001100111	0		159	11001110011000	0
		160	00110000111110	0		160	11001111000001	0
25		161	00110000111111	0		161	11001111100000	0
		162	00111111100001	2		162	11001111100110	4
		163	00111111001100	2		163	11001111110001	4
		164	00111111000110	2		164	11001111111000	4
		165	00111111000011	2	3 (B)	165	11100001111110	4
		166	00111110011100	2		166	11100011001111	4
		167	00111110011001	2		167	11100011100111	4
30		168	00111110001110	2		168	11100011110011	4
		169	00111110000111	2		169	11100011111001	4
		170	001111100111100	2		170	11100011111100	4
		171	001111100111001	2		171	11100110001111	4
		172	001111100110011	2		172	11100110011110	4
		173	001111100011110	2		173	11100111000111	4
		174	001111100001111	2		174	11100111001110	4
		175	001110011111100	2		175	11100111100011	4
35		176	00111001111001	2		176	11100111100110	4
		177	00111001110011	2		177	11100111110001	4
		178	00111001100111	2		178	11100111111000	4
		179	001110001111110	2		179	11100000011111	2
		180	001110000111111	2		180	11100000111110	2
		181	001100111111100	2		181	11100001100111	2
40		182	00110011111001	2		182	11100001110011	2
		183	00110011110011	2		183	11100001111001	2
		184	00110011100111	2		184	11100001111100	2
		185	00110011001111	2		185	11100011000111	2
		186	001100011111110	2		186	11100011001110	2
		187	00111111100110	4		187	11100011100011	2
		188	00111111100011	4		188	11100011100110	2
		189	001111111001110	4		189	11100011110001	2
45		190	00111111000111	4		190	11100011111000	2
		191	001111110011110	4		191	11100110000111	2
		192	00111110001111	4		192	11100110001110	2
		193	001111100111110	4		193	11100110011001	2
		194	001111100011111	4		194		11100110011100	2
		195	001110011111110	4		195		11100111000011	2
		196	001100111111110	4		196		11100111000110	2
50		197	00111111100111	6		197		11100111001100	2
		198	001111111001111	6		198		11100111100001	2
		199	001111110011111	6		199		11100111110000	2

Table 17 (CDS  $\geq 0$ )

	Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	3 (A)	200	0001111110000	0	3 (B)	200	11100000001111	0
		201	0001111110001	0		201	11100000001110	0
		202	00011111001100	0		202	11100000110011	0
		203	00011111000110	0		203	11100000111001	0
		204	00011111000011	0		204	11100000111100	0
10		205	00011110011100	0		205	11100001100011	0
		206	00011110011001	0		206	11100001100110	0
		207	00011110001110	0		207	11100001110001	0
		208	00011110000111	0		208	11100001111000	0
		209	00011100111100	0		209	11100011000011	0
		210	00011100111001	0		210	11100011000110	0
		211	00011100110011	0		211	11100011001100	0
15		212	00011100011110	0		212	11100011100001	0
		213	00011100001111	0		213	11100011110000	0
		214	00011001111100	0		214	11100110000011	0
		215	00011001111001	0		215	11100110000110	0
		216	00011001110011	0		216	11100110001100	0
		217	00011001100111	0		217	11100110011000	0
		218	00011000111110	0		218	11100111000001	0
20		219	00011000011111	0		219	11100111100000	0
	4 (A)	220	0001111110001	2	4 (B)	220	11110000001111	2
		221	00011111100110	2		221	11110000001110	2
		222	00011111100011	2		222	11110000110011	2
		223	00011111001110	2		223	11110000111001	2
		224	00011111000111	2		224	11110000111100	2
		225	00011110011110	2		225	11110001100011	2
25		226	00011110001111	2		226	11110001100110	2
		227	00011100111110	2		227	11110001110001	2
		228	00011100011111	2		228	11110001111000	2
		229	00011001111110	2		229	11110011000011	2
		230	0001111110011	4		230	11110011000110	2
		231	00011111100111	4		231	11110011001100	2
		232	00011111001111	4		232	11110011100001	2
		233	00011110011111	4		233	11110011110000	2
30		234	00001111111000	0		234	11110000000011	0
	4 (A)	235	00001111110001	0		235	11110000001110	0
		236	00001111100110	0		236	11110000011001	0
		237	00001111100011	0		237	11110000011100	0
		238	00001111001110	0		238	11110000110001	0
		239	00001111000111	0		239	11110000111000	0
		240	00001110011110	0		240	11110001100001	0
35		241	00001110001111	0		241	11110001110000	0
		242	00001100111110	0		242	11110011000001	0
		243	00001100011111	0		243	11110011100000	0
		244	00001111111001	2	5 (B)	244	11111000000111	2
		245	00001111110011	2		245	11111000011100	2
		246	00001111100111	2		246	11111000110001	2
		247	00001111001111	2		247	11111000111000	2
40		248	00001110011111	2		248	11111001110000	2
	5 (A)	249	00000111111100	0		249	11111000000011	0
		250	00000111111001	0		250	11111000000110	0
		251	00000111110011	0		251	11111000001100	0
		252	00000111100111	0		252	11111000011000	0
		253	00000111001111	0		253	11111000110000	0
		254	00000110011111	0		254	11111001100000	0
45	6 (A)	255	00000011111110	0	6 (B)	255	11111100000001	0

Table 18 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
5	0	01111110000001	0		0	10000001111110	0
	1	01111100110000	0		1	10000011001111	0
	2	01111100011000	0		2	10000011100111	0
	3	01111100001100	0		3	10000011110011	0
	4	01111100000110	0		4	10000011111001	0
10	5	01111100000011	0		5	10000011111100	0
	6	01111001110000	0		6	10000110001111	0
	7	01111001100001	0		7	10000110011110	0
	8	01111000111000	0		8	10000111000111	0
	9	01111000110001	0		9	10000111001110	0
	10	01111000011100	0		10	10000111100011	0
	11	01111000011001	0		11	10000111100110	0
	12	01111000001110	0		12	10000111110001	0
15	13	01111000000111	0		13	10000111111000	0
	14	01110011111000	0		14	10001100001111	0
	15	01110011100001	0		15	10001100011110	0
	16	01110011001100	0		16	10001100110011	0
	17	01110011000110	0		17	10001100111001	0
	18	01110011000011	0		18	10001100111100	0
	19	01110001111000	0		19	10001110000111	0
20	20	01110001110001	0		20	10001110001110	0
	21	01110001100110	0		21	10001110011001	0
	22	01110001100011	0		22	10001110011100	0
	23	01110000111100	0		23	10001111000011	0
	24	01110000111001	0		24	10001111000110	0
	25	01110000110011	0		25	10001111001100	0
	26	01110000011110	0		26	10001111100001	0
25	27	01110000001111	0	1 (D)	27	10001111110000	0
	28	01100111110000	0		28	10011000001111	0
	29	01100111100001	0		29	10011000011110	0
	30	01100111001100	0		30	10011000110011	0
	31	01100111000110	0		31	10011000111001	0
	32	01100111000011	0		32	10011000111100	0
	33	01100110011100	0		33	10011001100011	0
30	34	01100110011001	0		34	10011001100110	0
	35	01100110001110	0		35	10011001110001	0
	36	01100110000111	0		36	10011001111000	0
	37	01100011111000	0		37	10011100000111	0
	38	01100011110001	0		38	10011100001110	0
	39	01100011100110	0		39	10011100011001	0
	40	01100011100011	0		40	10011100011100	0
	41	01100011001110	0		41	10011100110001	0
35	42	01100011000111	0		42	10011100111000	0
	43	01100001111100	0		43	10011110000011	0
	44	01100001111001	0		44	10011110000110	0
	45	01100001110011	0		45	10011110001100	0
	46	01100001100111	0		46	10011110011000	0
	47	01100000111110	0		47	10011111000001	0
	48	01100000011111	0		48	10011111100000	0
40	49	01111100000001	-2		49	10000000111110	-2
	50	01111001100000	-2		50	10000001100111	-2
	51	01111000110000	-2		51	10000001110011	-2
	52	01111000011000	-2		52	10000001111001	-2
	53	01111000001100	-2		53	10000001111100	-2
	54	01111000000110	-2		54	10000011000111	-2
	55	01111000000011	-2		55	10000011001110	-2
45	56	01110011100000	-2		56	10000011100011	-2
	57	01110011000001	-2		57	10000011100110	-2
	58	01110001110000	-2		58	10000011110001	-2
	59	01110001100001	-2		59	10000011111000	-2
	60	01110000111000	-2		60	10000110000111	-2
	61	01110000110001	-2		61	10000110001110	-2
	62	01110000011100	-2		62	10000110011001	-2
50	63	01110000011001	-2		63	10000110011100	-2
	64	01110000001110	-2		64	10000111000011	-2
	65	01110000000111	-2		65	10000111000110	-2
	66	01100111100000	-2		66	10000111001100	-2

Table 18 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
1 (C)	67	01100111000001	-2	1 (D)	67	10000111100001	-2
	68	01100110011000	-2		68	10000111110000	-2
	69	01100110001100	-2		69	10001100000111	-2
	70	01100110000110	-2		70	10001100001110	-2
	71	01100110000011	-2		71	10001100011001	-2
	72	01100011110000	-2		72	10001100011100	-2
	73	01100011100001	-2		73	10001100110001	-2
	74	01100011001100	-2		74	10001100111000	-2
	75	01100011000110	-2		75	10001110000011	-2
	76	01100011000011	-2		76	10001110000110	-2
	77	01100001111000	-2		77	10001110001100	-2
	78	01100001110001	-2		78	10001110011000	-2
	79	01100001100110	-2		79	10001110000011	-2
	80	01100001100011	-2		80	10001111100000	-2
	81	01100000111100	-2		81	10011000000111	-2
2 (C)	82	01100000111001	-2		82	10011000000110	-2
	83	01100000110011	-2		83	10011000011001	-2
	84	01100000011110	-2		84	10011000011100	-2
	85	01100000001111	-2		85	10011000110001	-2
	86	01100000111000	-4		86	10011000111000	-2
	87	00111100000001	-4		87	10011001100001	-2
	88	00111001100000	-4		88	10011001110000	-2
	89	00111000110000	-4		89	10011100000011	-2
	90	00111000011000	-4		90	10011100000110	-2
	91	00111000001100	-4		91	100111000001100	-2
	92	00111000000110	-4		92	10011100011000	-2
	93	00111000000011	-4		93	10011100110000	-2
	94	00110011100000	-4		94	10011110000001	-2
	95	00110011000001	-4		95	10000000110011	-4
	96	00110001110000	-4		96	10000000111001	-4
	97	00110001100001	-4		97	10000000111100	-4
	98	00110000111000	-4		98	10000001100011	-4
	99	00110000110001	-4		99	10000001100110	-4
	100	00110000011100	-4		100	10000001110001	-4
	101	00111110000001	-2		101	10000001111000	-4
	102	00111100110000	-2		102	10000011000011	-4
	103	00111100011000	-2		103	10000011000110	-4
	104	00111100001100	-2		104	10000011001100	-4
	105	00111100000110	-2		105	10000011100001	-4
	106	00111100000011	-2		106	10000011110000	-4
	107	00111001110000	-2		107	10000110000011	-4
	108	00111001100001	-2		108	10000110000110	-4
	109	00111000111000	-2		109	10000110001100	-4
	110	00111000110001	-2		110	10000110011000	-4
	111	00111000011100	-2		111	10000111000001	-4
	112	00111000011001	-2		112	10000111100000	-4
	113	00111000001110	-2		113	10001100000011	-4
	114	00111000000111	-2		114	10001100000110	-4
	115	00110011110000	-2		115	10001100001100	-4
	116	00110011100001	-2		116	10001100011000	-4
	117	00110011001100	-2		117	10001100110000	-4
	118	00110011000110	-2		118	10001110000001	-4
	119	00110011000011	-2		119	10011000000011	-4
	120	00110001111000	-2		120	10011000000110	-4
	121	00110001110001	-2		121	10011000001100	-4
	122	00110001100110	-2		122	10011000011000	-4
	123	00110001100011	-2		123	10011000110000	-4
	124	00110000111100	-2		124	10011001100000	-4
	125	00110000111001	-2		125	10011100000001	-4
	126	00110000110011	-2		126	10000000111000	-6
	127	00110000011110	-2		127	10000001110000	-6
	128	00110000001111	-2		128	10000011100000	-6
2 (D)	129	00111111100000	0	2 (D)	129	11000000011111	0
	130	00111111100001	0		130	11000000111110	0
	131	00111110011000	0		131	11000001100111	0
	132	00111110001100	0		132	11000001110011	0

Table 18 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
2 (c)	133	00111110000110	0	2 (d)	133	11000001111001	0
	134	00111110000011	0		134	11000001111100	0
	135	00111100111000	0		135	11000011000111	0
	136	00111100110001	0		136	11000011001110	0
	137	00111100011100	0		137	11000011100011	0
	138	00111100011001	0		138	11000011100110	0
	139	00111100001110	0		139	11000011110001	0
	140	00111100000111	0		140	11000011111000	0
	141	00111001111000	0		141	11000110000111	0
	142	00111001110001	0		142	11000110001110	0
	143	00111001100110	0		143	11000110011001	0
	144	00111001100011	0		144	11000110011100	0
	145	00111000111100	0		145	11000111000011	0
	146	00111000111001	0		146	11000111000110	0
	147	00111000110011	0		147	11000111001100	0
3 (c)	148	00111000011110	0		148	11000111100001	0
	149	00111000001111	0		149	11000111110000	0
	150	00110011111000	0		150	11001100000111	0
	151	00110011110001	0		151	11001100001110	0
	152	00110011100110	0		152	11001100011001	0
	153	00110011100011	0		153	11001100011100	0
	154	00110011001110	0		154	11001100110001	0
	155	00110011000111	0		155	11001100111000	0
	156	00110001111100	0		156	11001110000011	0
	157	00110001111001	0		157	11001110000110	0
	158	00110001110011	0		158	11001110001100	0
	159	00110001100111	0		159	11001110011000	0
	160	00110000111110	0		160	11001111000001	0
	161	00110000011111	0		161	11001111100000	0
	162	00110000011001	-4		162	11000000011110	-2
	163	00110000001110	-4		163	11000000110011	-2
	164	00110000000111	-4		164	11000000111001	-2
3 (c)	165	00011110000001	-4	3 (c)	165	11000000111100	-2
	166	00011110011000	-4		166	11000001100011	-2
	167	00011110001100	-4		167	11000001100110	-2
	168	00011110000110	-4		168	11000001110001	-2
	169	00011110000011	-4		169	11000001111000	-2
	170	00011110000001	-4		170	11000011000011	-2
	171	00011001110000	-4		171	11000011000110	-2
	172	00011001100001	-4		172	11000011001100	-2
	173	00011000111000	-4		173	11000011100001	-2
	174	00011000110001	-4		174	11000011110000	-2
	175	00011000011100	-4		175	11000110000011	-2
	176	00011000011001	-4		176	11000110000110	-2
	177	00011000001110	-4		177	11000110001100	-2
	178	00011000000111	-4		178	11000110011000	-2
	179	00011111100000	-2		179	11000111000001	-2
	180	00011111000001	-2		180	11000111100000	-2
3 (c)	181	00011110011000	-2		181	11001100000011	-2
	182	00011110001100	-2		182	11001100000110	-2
	183	00011110000110	-2		183	11001100001100	-2
	184	00011110000011	-2		184	11001100011000	-2
	185	00011110011100	-2		185	11001100110000	-2
	186	00011110011001	-2		186	11001110000001	-2
	187	00011110001110	-2		187	11000000011001	-4
	188	000111100011001	-2		188	11000000011100	-4
	189	000111100001110	-2		189	11000000110001	-4
	190	000111100000111	-2		190	11000000111000	-4
	191	00011001111000	-2		191	11000001100001	-4
	192	00011001110001	-2		192	11000001110000	-4
	193	00011001100110	-2		193	11000011000001	-4
	194	00011001100011	-2		194	11000011100000	-4
	195	00011000111100	-2		195	11000110000001	-4
	196	00011000111001	-2		196	11001100000001	-4
3 (c)	197	00011000110011	-2		197	11000000011000	-6
	198	00011000011110	-2		198	11000000110000	-6
	199	00011000001111	-2		199	11000001100000	-6

Table 18 (CDS  $\leq 0$ )

Class	8-bit data	Modulation codes beginning with "0"	CDS	Class	8-bit data	Modulation codes beginning with "1"	CDS
3 (C)	200	0001111110000	0	3 (D)	200	11100000001111	0
	201	00011111100001	0		201	11100000001110	0
	202	00011111001100	0		202	111000000110011	0
	203	00011111000110	0		203	111000000111001	0
	204	00011111000011	0		204	111000000111100	0
	205	00011110011100	0		205	11100001100011	0
	206	00011110011001	0		206	11100001100110	0
	207	00011110001110	0		207	11100001110001	0
	208	00011110000111	0		208	11100001111000	0
	209	00011100111100	0		209	11100011000011	0
	210	00011100111001	0		210	11100011000110	0
	211	00011100110011	0		211	11100011001100	0
	212	00011100011110	0		212	11100011100001	0
	213	00011100001111	0		213	11100011110000	0
	214	00011001111100	0		214	11100110000011	0
	215	00011001111001	0		215	11100110000110	0
	216	00011001110011	0		216	11100110001100	0
	217	00011001100111	0		217	11100110011000	0
	218	00011000111110	0		218	11100111000001	0
	219	00011000011111	0		219	11100111100000	0
4 (C)	220	00001111110000	-2	4 (D)	220	11100000001110	-2
	221	00001111100001	-2		221	11100000011001	-2
	222	00001111001100	-2		222	11100000011100	-2
	223	00001111000110	-2		223	11100000110001	-2
	224	00001111000011	-2		224	11100000111000	-2
	225	00001110011100	-2		225	11100001100001	-2
	226	00001110011001	-2		226	11100001110000	-2
	227	00001110001110	-2		227	11100011000001	-2
	228	00001110000111	-2		228	11100011100000	-2
	229	00001100111100	-2		229	11100110000001	-2
	230	00001100111001	-2		230	11100000001100	-4
	231	00001100110011	-2		231	11100000011000	-4
	232	00001100011110	-2		232	11100000110000	-4
	233	00001100001111	-2		233	11100001100000	-4
	234	00001111111000	0		234	11110000000111	0
5 (C)	235	00001111110001	0	5 (D)	235	11110000001110	0
	236	00001111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	00001111001110	0		238	11110000110001	0
	239	00001111000111	0		239	11110000111000	0
	240	00001110011110	0		240	11110001100001	0
	241	00001110001111	0		241	11110001110000	0
	242	00001100111110	0		242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00000111111000	-2		244	11110000000110	-2
6 (C)	245	00000111100011	-2	6 (D)	245	11110000001100	-2
	246	00000111001110	-2		246	11110000011000	-2
	247	00000111000111	-2		247	11110000110000	-2
	248	00000110001111	-2		248	11110001100000	-2
	249	00000111111100	0		249	11111000000011	0
	250	00000111110011	0		250	11111000000110	0
	251	00000111100111	0		251	11111000001100	0
7 (C)	252	00000111001111	0	7 (D)	252	11111000011000	0
	253	00000111001111	0		253	11111000110000	0
	254	00000110011111	0		254	11111001100000	0
	255	00000011111110	0		255	11111000000001	0

## Patentansprüche

1. Digitales Modulationsverfahren zum Umsetzen von digitalen 8-Bit-Daten in digitale 14-Bit-Modulationscodes, gekennzeichnet durch:

einen Schritt 1 zum Wählen von bis zu vier digitalen 14-Bit-Modulationscodes für jeden digitalen 8-Bit-Datenwert, wobei der digitale 14-Bit-Modulationscode durch Prozeduren gewählt wird, bei denen

- (a) aus  $2^{14}$  digitalen 14-Bit-Codes ein digitaler Code gewählt wird, in welchem die Anzahl von aufeinanderfolgenden identischen Bits in den ersten 6 Bits 5 oder weniger, von dem 2. Bit bis zu dem 13. Bit 2 bis 7 und in den letzten 7 Bits 6 oder weniger beträgt, wobei der Absolutwert der digitalen Codewortsumme CDS des gewählten digitalen Codes 4 oder weniger beträgt, und diese Wahlprozedur wieder-

holt wird,

(b) aus den bei der Prozedur (a) gewählten digitalen 14-Bit-Codes ein digitaler Code, dessen erstes Bit "0" ist und dessen Wert der digitalen Codewortsumme CDS 0 ist, und der gewählte digitale 14-Bit-Code mit dem Umkehrcode desselben zu einer Gruppe aus 2 digitalen Codes zusammengefaßt wird, oder aus dem aus der Prozedur (a) gewählten digitalen 14-Bit-Codes ein digitaler Code gewählt wird, dessen erstes Bit "1" ist und dessen Wert der digitalen Codewortsumme CDS +2 oder +4 ist, die gewählten digitalen 14-Bit-Codes mit dem Umkehrcodes derselben kombiniert werden und weiterhin die beiden digitalen 14-Bit-Codes mit einem bei der vorangehenden Prozedur gewählten Paar von digitalen 14-Bit-Codes zum Bilden einer Gruppe aus 4 digitalen Codes kombiniert werden und diese Wahlprozedur wiederholt wird,

(c) aus den bei der Prozedur (a) gewählten digitalen 14-Bit-Codes ein digitaler Code, dessen erstes Bit "0" ist und dessen Wert der digitalen Codewortsumme CDS +2 ist, und ein anderer digitaler Code gewählt wird, dessen erstes Bit "1" ist und dessen Wert der digitalen Codewortsumme CDS +2 oder +4 ist, die beiden gewählten digitalen 14-Bit-Codes mit deren Umkehrcodes zu einer Gruppe aus 4 digitalen Codes kombiniert werden und diese Wahlprozedur wiederholt wird,

(d) aus den bei der Prozedur (a) gewählten digitalen 14-Bit-Codes ein digitaler Code, dessen erstes Bit "0" ist und dessen Wert der digitalen Codewortsumme CDS +4 ist, und ein anderer digitaler Code gewählt wird, dessen erstes Bit "1" ist und dessen Wert der digitalen Codewortsumme CDS +2 ist, die beiden gewählten digitalen 14-Bit-Codes mit deren Umkehrcodes zum Bilden eine Gruppe aus 4 digitalen Codes kombiniert werden und diese Wahlprozedur wiederholt wird, und

(e) aus den bei den vorangehenden Prozeduren gebildeten Gruppen als digitale 14-Bit-Modulationscodes 256 Gruppen gewählt werden,

einen Schritt 2, bei dem aus den 256 Gruppen von digitalen 14-Bit-Modulationscodes eine Gruppe von digitalen 14-Bit-Modulationscodes gewählt wird, die dem eingegebenen digitalen 8-Bit-Datenwert entspricht,

einen Schritt 3, bei dem weiterhin in der bei dem Schritt 2 gewählten Gruppe mindestens ein digitaler 14-Bit-Modulationscode gewählt wird, der jeweils der Erfordernis genügt, daß die Anzahl von aufeinanderfolgenden identischen Bits an dem gemeinsamen Abschnitt des schon gewählten vorangehenden digitalen 14-Bit-Modulationscodes und des zu wählenden digitalen 14-Bit-Modulationscodes 2 bis 7 beträgt, und

einen Schritt 4, bei dem aus den bei dem Schritt 3 gewählten Modulationscodes weiterhin ein digitaler 14-Bit-Modulationscodes derart gewählt wird, daß dieser eine digitale 14-Bit-Modulationscode der Erfordernis genügt, daß der Absolutwert des digitalen Bit-Summenwertes DSV für jedes Bit in dem Modulationscode gleich 7 oder geringer ist.

## 2. Digitales Modulationsverfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Schritt 3 Prozeduren umfaßt, bei denen

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "10" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "01", "001", "0001", "00001" oder "000001" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "01" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "10", "110", "1110", "11110" oder "111110" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "100" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110" oder "01", "001", "0001", "00001" oder "000001" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "011" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001", "10", "110", "1110", "11110" oder "111110" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "1000" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110", "01", "001", "0001" oder "00001" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "0111" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001", "10", "110", "1110" oder "11110" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "10000" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110", "01", "001" oder "0001" sind,



dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "01111" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001", "10", "110" oder "1110" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "100000" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110", "01" oder "001" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "011111" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001", "10" oder "110" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "1000000" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110" oder "01" sind, und

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "0111111" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001" oder "10" sind.

3. Digitales Modulationsverfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Schritt 4 Prozeduren umfaßt, bei denen

dann, wenn der digitale Summenwert DSV an dem Ende des schon gewählten vorangehenden digitalen 14-Bit-Modulationscodes +2 ist, irgendeiner der digitalen Modulationscodes gewählt wird, dessen Codewortsumme CDS 0, -2 oder -4 ist,

dann, wenn der digitale Summenwert DSV an dem Ende des schon gewählten vorangehenden digitalen 14-Bit-Codes 0 ist, irgendeiner der digitalen Modulationscodes gewählt wird, dessen Codewortsumme CDS +2, 0 oder -2 ist, und

dann, wenn der digitale Summenwert DSV an dem Ende des schon gewählten vorangehenden digitalen 14-Bit-Modulationscodes -2 ist, irgendeiner der digitalen Modulationscodes gewählt wird, dessen Codewortsumme CDS +4, +2 oder 0 ist.

4. Digitales Modulationsverfahren nach Anspruch 1, dadurch gekennzeichnet, daß die bei dem Schritt 1 erhaltenen digitalen Modulationscodes die in den nachstehenden Tabellen 4 und 5 angeführten Codes oder die durch Ersetzen eines Teils der Tabelle 4 durch die nachstehende Tabelle 12 erhaltenen Codes oder die durch Ersetzen eines Teils der Tabelle 5 durch die nachstehende Tabelle 13 erhaltenen Codes sind.

Tabelle 4 (CDS  $\geq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5	0	01111110000001	0		0	10000001111110	0
	1	01111100110000	0		1	10000011001111	0
	2	01111100011000	0		2	10000011100111	0
	3	01111100001100	0		3	10000011110011	0
10	4	01111100000110	0		4	10000011111001	0
	5	01111100000011	0		5	10000011111100	0
	6	01111001110000	0		6	10000110001111	0
	7	01111001100001	0		7	10000110011110	0
	8	01111000111000	0		8	10000111000111	0
	9	01111000110001	0		9	10000111001110	0
15	10	01111000011100	0		10	10000111100011	0
	11	01111000011001	0		11	10000111100110	0
	12	01111000001110	0		12	10000111110001	0
	13	01111000000111	0		13	10000111111000	0
	14	01110011110000	0		14	10001100001111	0
	15	01110011100001	0		15	10001100011110	0
20	16	01110011001100	0		16	10001100110011	0
	17	01110011000110	0		17	10001100111001	0
	18	01110011000011	0		18	10001100111100	0
	19	01110001111000	0		19	10001110000111	0
	20	01110001110001	0		20	10001110001110	0
	21	01110001100110	0		21	10001110011001	0
	22	01110001100011	0		22	10001110011100	0
25	23	01110000111100	0		23	10001111000011	0
	24	01110000111001	0		24	10001111000110	0
	25	01110000110011	0		25	10001111001100	0
	26	01110000011110	0		26	10001111100001	0
	27	01110000001111	0		27	10001111110000	0
	28	01100111110000	0		28	10011000001111	0
	29	01100111100001	0		29	10011000011110	0
30	30	01100111001100	0		30	10011000110011	0
	31	01100111000110	0		31	10011000111001	0
	32	01100111000011	0		32	10011000111100	0
	33	01100110011100	0		33	10011001100011	0
	34	01100110011001	0		34	10011001100110	0
	35	01100110001110	0		35	10011001110001	0
35	36	01100110000111	0		36	10011001111000	0
	37	01100011111000	0		37	10011100000111	0
	38	01100011110001	0		38	10011100001110	0
	39	01100011100110	0		39	10011100011001	0
	40	01100011100011	0		40	10011100011100	0
	41	01100011001110	0		41	10011100110001	0
	42	01100011000111	0		42	10011100111000	0
40	43	01100001111100	0		43	10011110000011	0
	44	01100001111001	0		44	10011110000110	0
	45	01100001110011	0		45	10011110001100	0
	46	01100001100111	0		46	10011110011000	0
	47	01100000111110	0		47	10011111000001	0
	48	01100000011111	0		48	10011111100000	0
45	49	01111111001100	4		49	10000011111110	2
	50	01111111000110	4		50	10000110011111	2
	51	01111111000011	4		51	10000111001111	2
	52	01111111001110	4		52	10000111100111	2
	53	011111110011001	4		53	10000111110011	2
	54	011111110001110	4		54	10000111111001	2
50	55	011111110000111	4		55	10000111111100	2
	56	011111100111100	4		56	10001100011111	2
	57	011111100111001	4		57	10001100111110	2
	58	011111100110011	4		58	10001110001111	2
	59	011111100011110	4		59	10001110011110	2
	60	011111100001111	4		60	10001111000111	2
55	61	011111001111100	4		61	10001111001110	2
	62	011111001111001	4		62	10001111100011	2
	63	011111001110011	4		63	10001111100110	2

Tabelle 4 (CDS  $\geq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5							
	64	01111001100111	4		64	1000111110001	2
	65	01111000111110	4		65	1000111111000	2
	66	01111000011111	4		66	10011000011111	2
	67	01110011111100	4		67	10011000111110	2
10	68	01110011111001	4		68	10011001100111	2
	69	01110011110011	4		69	10011001110011	2
	70	01110011100111	4		70	10011001111001	2
	71	01110011001111	4		71	10011001111100	2
	72	01110001111110	4		72	10011100001111	2
	73	01110000111111	4		73	10011100011110	2
15	74	01100111111100	4		74	10011100110011	2
	75	01100111111001	4		75	10011100111001	2
	76	01100111110011	4		76	10011100111100	2
	77	01100111100111	4		77	10011110000111	2
	78	01100111001111	4		78	10011110001110	2
	79	01100110011111	4	1(B)	79	10011110011001	2
	80	01100011111110	4		80	10011110011100	2
20	81	01111111000001	2		81	10011111000011	2
	82	01111110011000	2		82	10011111000110	2
	83	01111110001100	2		83	10011111001100	2
	84	01111110000110	2		84	10011111100001	2
	85	01111110000011	2		85	10011111110000	2
	86	01111100111000	2		86	10001111001111	4
25	87	01111100110001	2		87	10001111100111	4
	88	01111100011100	2		88	10001111110011	4
	89	01111100011001	2		89	10011001111110	4
	90	01111100001110	2		90	10011100111110	4
	91	01111100000111	2		91	10011110001111	4
	92	011110011111000	2		92	10011110011110	4
30	93	01111001110001	2		93	10011111000111	4
	94	01111001100110	2		94	10011111001110	4
	95	01111001100011	2		95	10011111100011	4
	96	011110001111100	2		96	100111111100110	4
35	97	01111000111001	2		97	110001111100111	4
	98	01111000110011	2		98	11000111110011	4
	99	01111000011110	2		99	11000000111111	2
	100	01111000001111	2		100	11000001111110	2
	101	01110011111000	2		101	11000011001111	2
	102	01110011110001	2		102	11000011100111	2
	103	01110011100110	2		103	11000011110011	2
	104	01110011100011	2		104	11000011111001	2
	105	01110011001110	2		105	11000011111100	2
40	106	01110011000111	2		106	11000110001111	2
	107	01110001111100	2		107	11000110011110	2
	108	01110001111001	2	2(B)	108	11000111000111	2
	109	01110001110011	2		109	11000111001110	2
	110	01110001100111	2		110	11000111100011	2
	111	01110000111110	2		111	11000111100110	2
45	112	01110000011111	2		112	11000111110001	2
	113	01100111111000	2		113	11000111111000	2
	114	01100111110001	2		114	11001100001111	2
	115	01100111100110	2		115	11001100011110	2
	116	01100111100011	2		116	11001100110011	2
	117	01100111001110	2		117	11001100111001	2
	118	01100111000111	2		118	11001100111100	2
50	119	01100110011110	2		119	11001110000111	2
	120	01100110001111	2		120	11001110001110	2
	121	01100011111100	2		121	11001110011001	2
	122	01100011111001	2		122	11001110011100	2
	123	01100011110011	2		123	11001111000011	2
	124	01100011100111	2		124	11001111000110	2
55	125	01100011001111	2		125	11001111001100	2
	126	01100001111110	2		126	11001111100001	2
	127	01100000111111	2		127	11001111110000	2

Tabelle 4 (CDS  $\geq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5		128 0011111100000	0		128 11000000011111	0	
		129 00111111000001	0		129 11000000111110	0	
		130 001111110011000	0		130 11000001100111	0	
		131 001111110001100	0		131 11000001110011	0	
10		132 001111110000110	0		132 11000001111001	0	
		133 001111110000011	0		133 11000001111100	0	
		134 001111100111000	0		134 11000011000111	0	
		135 001111100110001	0		135 11000011001110	0	
		136 001111100011100	0		136 11000011100011	0	
		137 001111100011001	0		137 11000011100110	0	
15		138 001111100001110	0		138 11000011110001	0	
		139 001111100000111	0		139 11000011111000	0	
		140 001111001111000	0		140 110001100000111	0	
		141 001111001110001	0		141 11000110001110	0	
		142 001111001100110	0		142 11000110011001	0	
		143 001111001100011	0	2(B)	143 11000110011100	0	
20		144 001111000111100	0		144 11000111000011	0	
		145 001111000111001	0		145 11000111000110	0	
		146 001111000110011	0		146 11000111001100	0	
		147 001111000011110	0		147 11000111100001	0	
		148 001111000001111	0		148 11000111110000	0	
		149 001100111111000	0		149 110011000000111	0	
25		150 001100111100001	0		150 11001100001110	0	
		151 001100111001110	0		151 11001100011001	0	
		152 001100111000111	0		152 11001100011100	0	
		153 001100110011110	0		153 11001100110001	0	
		154 001100110001111	0		154 11001100111000	0	
		155 001100011111000	0		155 11001110000011	0	
		156 001100011110001	0		156 11001110000110	0	
30		157 001100011100111	0		157 11001110001100	0	
		158 001100011001111	0		158 11001110011000	0	
		159 001100001111110	0		159 11001111000001	0	
		160 001100000111111	0		160 11001111100000	0	
	2(A)	161 00111111100001	2		161 11001100111110	4	
		162 00111111001100	2		162 11001110011110	4	
35		163 00111111000110	2		163 11001111000111	4	
		164 00111111000011	2		164 11001111001110	4	
		165 001111110011100	2		165 11001111100011	4	
		166 001111110011001	2		166 11001111100110	4	
		167 001111110001110	2		167 11100001111110	4	
		168 001111110000111	2		168 11100011100111	4	
40		169 001111100111100	2		169 11100011110011	4	
		170 001111100111001	2		170 11100011111100	4	
		171 001111100110011	2		171 11100110011110	4	
		172 001111100011110	2	3(B)	172 11100111000111	4	
		173 001111100001111	2		173 11100111001110	4	
		174 001111001111100	2		174 11100111100011	4	
		175 001111001111001	2		175 11100111100110	4	
45		176 001111001110011	2		176 11100111111000	4	
		177 001111001100111	2		177 11100000011111	2	
		178 001111000111110	2		178 11100000111110	2	
		179 001111000011111	2		179 11100001100111	2	
		180 00110011111100	2		180 11100001110011	2	
		181 00110011111001	2		181 11100001111001	2	
50		182 00110011110011	2		182 11100001111100	2	
		183 00110011100111	2		183 11100011000111	2	
		184 001100110011111	2		184 11100011001110	2	
		185 001100011111110	2		185 11100011100011	2	
		186 001100001111111	2		186 11100011100110	2	
		187 001111111100110	4		187 11100011110001	2	
		188 00111111100011	4		188 11100011111000	2	
55		189 00111111001110	4		189 11100110000111	2	
		190 00111111000111	4		190 11100110001110	2	
		191 001111110011110	4		191 11100110011001	2	

Tabelle 4 (CDS  $\geq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5	2(A)	192	00111110001111		192	11100110011100	2
		193	00111100111110		193	11100111000011	2
		194	00111100011111		194	11100111000110	2
		195	00111001111110		195	11100111001100	2
		196	00111000111111		196	11100111100001	2
		197	00110011111110		197	11100111110000	2
10		198	00011111110000		198	11100000001111	0
		199	00011111100001		199	11100000011110	0
		200	00011111001100		200	11100000110011	0
		201	00011111000110		201	11100000111001	0
		202	00011111000011		202	11100000111100	0
		203	00011110011100		203	11100001100011	0
15		204	00011110011001		204	11100001100110	0
		205	00011110001110		205	11100001110001	0
		206	00011110000111		206	11100001111000	0
		207	00011100111100		207	11100011000011	0
		208	00011100111001		208	11100011000110	0
		209	00011100110011		209	11100011001100	0
20		210	00011100011110		210	11100011100001	0
		211	00011100001111		211	11100011110000	0
		212	00011001111100		212	11100110000011	0
		213	00011001111001		213	11100110000110	0
		214	00011001110011		214	11100110001100	0
		215	00011001100111		215	11100110011000	0
25		216	00011000111110		216	11100111000011	0
		217	00011000011111		217	11100111100000	0
		218	00011111110001		218	11110001111100	4
		219	00011111100110		219	11110011111000	4
		220	00011111100011		220	11110000001111	2
		221	00011111001110		221	11110000011110	2
30		222	00011111000111		222	11110000110011	2
		223	00011110011110		223	11110000111001	2
		224	00011110001111		224	11110000111100	2
		225	00011100111110		225	11110001100011	2
		226	00011100011111		226	11110001100110	2
		227	00011001111110		227	11110001110001	2
35		228	00011000111111		228	11110001111000	2
		229	00011111110011		229	11110011000011	2
		230	00011111100111		230	11110011000110	2
		231	00011111001111		231	11110011001100	2
		232	00011110011111		232	11110011100001	2
		233	00011100111111		233	11110011110000	2
40		234	00001111111000		234	11110000000111	0
		235	00001111110001		235	11110000001110	0
		236	00001111100110		236	11110000011001	0
		237	00001111100011		237	11110000011100	0
		238	00001111001110		238	11110000110001	0
		239	00001111000111		239	11110000111000	0
45		240	00001110011110		240	11110001100001	0
		241	00001110001111		241	11110001110000	0
		242	00001100111110		242	11110011000001	0
		243	00001100011111		243	11110011100000	0
		244	00001111111001		244	11111000000111	2
		245	00001111110011		245	11111000001110	2
50		246	00001111100111		246	11111000011001	2
		247	00001111001111		247	11111000011100	2
		248	00001110011111		248	11111000111000	2
		249	00001100111111		249	11111001110000	2
		250	00000111111100		250	11111000000011	0
		251	00000111111001		251	11111000000110	0
55	5(A)	252	00000111110011		252	11111000001100	0
		253	00000111100111		253	11111000011000	0
		254	00000111001111		254	11111000110000	0
		255	00000110011111		255	11111001100000	0

Tabelle 5 (CDS ≤ 0)

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5		0	0		0	1000000111110	0
	1	01111100110000	0		1	10000011001111	0
	2	01111100011000	0		2	10000011100111	0
	3	01111100001100	0		3	10000011110011	0
10	4	01111100000110	0		4	10000011111001	0
	5	01111100000011	0		5	10000011111100	0
	6	01111001110000	0		6	10000110001111	0
	7	01111001100001	0		7	10000110011110	0
	8	01111000111000	0		8	10000111000111	0
	9	01111000110001	0		9	10000111001110	0
15	10	01111000011100	0		10	10000111100011	0
	11	01111000011001	0		11	10000111100110	0
	12	01111000001110	0		12	10000111110001	0
	13	01111000000111	0		13	10000111111000	0
	14	01110011110000	0		14	10001100001111	0
	15	01110011100001	0		15	10001100011110	0
20	16	01110011001100	0		16	10001100110011	0
	17	01110011000110	0		17	10001100111001	0
	18	01110011000011	0		18	10001100111100	0
	19	01110001111000	0		19	10001110000111	0
	20	01110001110001	0		20	10001110001110	0
	21	01110001100110	0		21	10001110011001	0
	22	01110001100011	0		22	10001110011100	0
25	23	01110000111100	0		23	10001111000011	0
	24	01110000111001	0		24	10001111000110	0
	25	01110000110011	0		25	10001111001100	0
	26	01110000011110	0		26	10001111100001	0
	27	01110000001111	0		27	10001111110000	0
	28	01100111110000	0		28	10011000001111	0
	29	01100111100001	0		29	10011000011110	0
30	30	01100111001100	0		30	10011000110011	0
	31	01100111000110	0		31	10011000111001	0
	32	01100111000011	0		32	10011000111100	0
35	33	01100110011100	0		33	10011001100011	0
	34	01100110011001	0	1(D)	34	10011001100110	0
	35	01100110001110	0		35	10011001110001	0
	36	01100110000111	0		36	10011001111000	0
	37	01100011111000	0		37	10011100000111	0
	38	01100011110001	0		38	10011100001110	0
	39	01100011100110	0		39	10011100011001	0
	40	01100011100011	0		40	10011100011100	0
40	41	01100011001110	0		41	10011100110001	0
	42	01100011000111	0		42	10011100111000	0
	43	01100011111000	0		43	10011110000011	0
	44	01100011110001	0		44	10011110000110	0
	45	01100011100011	0		45	10011110001100	0
	46	01100011001110	0		46	10011110011000	0
	47	01100001111100	0		47	10011111000001	0
45	48	01100000111111	0		48	10011111100000	0
	49	01111100000001	-2		49	10000000110011	-4
	50	01111001100000	-2		50	10000000111001	-4
	51	01111000110000	-2		51	10000000111100	-4
	52	01111000011000	-2		52	10000001100011	-4
	53	01111000001100	-2		53	10000001100110	-4
50	54	01111000000110	-2		54	10000001110001	-4
	55	01111000000011	-2		55	10000001111000	-4
	56	01110011100000	-2		56	10000011000011	-4
	57	01110011000001	-2		57	10000011000110	-4
	58	01110001110000	-2		58	10000011001100	-4
	59	01110001100001	-2		59	10000011100001	-4
	60	01110000111000	-2		60	10000011110000	-4
55	61	01110000110001	-2		61	10000110000011	-4
	62	01110000011100	-2		62	10000110000110	-4
	63	01110000011001	-2		63	10000110001100	-4

Tabelle 5 (CDS ≤ 0)

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5		64 01110000001110	-2		64 10000110011000	-4	
		65 01110000000111	-2		65 10000111000001	-4	
		66 01100111100000	-2		66 10000111100000	-4	
		67 01100111000001	-2		67 10001100000011	-4	
10		68 01100110011000	-2		68 10001100000110	-4	
		69 01100110001100	-2		69 10001100001100	-4	
		70 01100110000110	-2		70 10001100011000	-4	
		71 01100110000011	-2		71 10001100110000	-4	
		72 01100011110000	-2		72 10001110000001	-4	
		73 01100011100001	-2		73 10001111000000	-4	
		74 01100011001100	-2		74 10011000000011	-4	
15		75 01100011000110	-2		75 10011000000110	-4	
		76 01100011000011	-2		76 10011000001100	-4	
		77 01100001111000	-2		77 10011000011000	-4	
		78 01100001110001	-2		78 10011000110000	-4	
	1(C)	79 01100001100110	-2		79 10011001100000	-4	
		80 01100001100011	-2		80 10011100000001	-4	
20		81 01100000111100	-2		81 10000000111110	-2	
		82 01100000111001	-2		82 10000001100111	-2	
		83 01100000110011	-2		83 10000001110011	-2	
		84 01100000011110	-2		84 10000001111001	-2	
		85 01100000001111	-2		85 10000001111100	-2	
		86 01110000110000	-4		86 10000011000111	-2	
25		87 01110000011000	-4		87 10000011001110	-2	
		88 01110000001100	-4		88 10000011100011	-2	
		89 01100110000001	-4		89 10000011100110	-2	
		90 01100011000001	-4		90 10000011110001	-2	
		91 01100001110000	-4		91 10000011111000	-2	
		92 01100001100001	-4		92 10000110000111	-2	
30		93 01100000111000	-4		93 10000110001110	-2	
		94 01100000110001	-4		94 10000110011001	-2	
		95 01100000011100	-4		95 10000110011100	-2	
		96 01100000011001	-4		96 10000111000011	-2	
		97 00111000011000	-4	1(D)	97 10000111000110	-2	
		98 00111000001100	-4		98 10000111001100	-2	
		99 00111111000000	-2		99 10000111100001	-2	
35		100 00111110000001	-2	100	10000111110000	-2	
		101 00111110011000	-2	101	10001100000011	-2	
		102 00111110001100	-2	102	10001100001110	-2	
		103 00111110000110	-2	103	10001100011001	-2	
		104 00111110000011	-2	104	10001100011100	-2	
		105 00111110000011	-2	105	10001100110001	-2	
		106 00111001110000	-2	106	10001100111000	-2	
40		107 00111001100001	-2	107	10001110000011	-2	
		108 00111000111000	-2	108	10001110000110	-2	
		109 00111000110001	-2	109	10001110001100	-2	
		110 00111000011100	-2	110	10001110011000	-2	
	2(C)	111 00111000011001	-2	111	10001111000001	-2	
		112 00111000001110	-2	112	10001111100000	-2	
45		113 00111000000111	-2	113	10011000000111	-2	
		114 00110011110000	-2	114	10011000001110	-2	
		115 00110011100001	-2	115	10011000011001	-2	
		116 00110011001100	-2	116	10011000011100	-2	
		117 00110011000110	-2	117	10011000110001	-2	
		118 00110011000011	-2	118	10011000111000	-2	
50		119 00110001111000	-2	119	10011001100001	-2	
		120 00110001110001	-2	120	10011001110000	-2	
		121 00110001100110	-2	121	10011100000011	-2	
		122 00110001100011	-2	122	10011100000110	-2	
		123 00110000111100	-2	123	10011100001100	-2	
		124 00110000111001	-2	124	10011100011000	-2	
		125 00110000110011	-2	125	10011100110000	-2	
55		126 00110000011110	-2	126	10011110000001	-2	
		127 00110000001111	-2	127	10011111000000	-2	

Tabelle 5 (CDS  $\leq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5							
	128	0011111100000	0		128	1100000001111	0
	129	0011111100000	0		129	1100000011110	0
	130	00111110011000	0		130	1100000110011	0
	131	00111110001100	0		131	1100000111001	0
10	132	00111110000110	0		132	1100000111001	0
	133	00111110000011	0		133	1100000111100	0
	134	00111100111000	0		134	1100001100011	0
	135	00111100110001	0		135	1100001100110	0
	136	00111100011100	0		136	1100001110001	0
	137	00111100011001	0		137	1100001110010	0
	138	00111100001110	0		138	1100001111000	0
15	139	00111100000111	0		139	11000011111000	0
	140	00111001111000	0		140	11000110000111	0
	141	00111001110001	0		141	11000110001110	0
	142	00111001100110	0		142	11000110011001	0
	143	00111001100011	0		143	11000110011100	0
	144	00111000111100	0		144	11000111000011	0
20	145	00111000111001	0		145	11000111000110	0
	146	00111000110011	0		146	11000111001100	0
	147	00111000011110	0		147	11000111100001	0
	148	00111000001111	0		148	11000111110000	0
	149	00110011111000	0		149	11001100000111	0
	150	00110011110001	0		150	11001100001110	0
25	151	00110011100110	0		151	11001100011001	0
	152	00110011100011	0		152	11001100011100	0
	153	00110011001110	0		153	11001100110001	0
	154	00110011000111	0		154	11001100111000	0
	155	00110001111100	0		155	11001110000011	0
	156	00110001111001	0		156	11001110000110	0
	157	00110001110011	0		157	11001110001100	0
30	158	00110001100111	0		158	11001110011000	0
	159	00110000111110	0		159	11001111000001	0
	160	00110000011111	0		160	11001111100000	0
	161	00110011000001	-4	2(D)	161	11000000011110	-2
	162	00110001100001	-4		162	11000000110011	-2
	163	00110000111000	-4		163	11000000111001	-2
35	164	00110000110001	-4		164	11000000111100	-2
	165	00110000011100	-4		165	11000001100011	-2
	166	00110000011001	-4		166	11000001100110	-2
	167	00011110000001	-4		167	11000001110001	-2
	168	000111100011000	-4		168	11000001111000	-2
	169	000111100001100	-4		169	11000011000011	-2
40	170	000111100000011	-4		170	11000011000110	-2
	171	00011001100001	-4		171	11000011001100	-2
	172	00011000111000	-4		172	11000011100001	-2
	173	00011000110001	-4		173	11000011110000	-2
	174	00011000011100	-4		174	11000110000011	-2
	175	00011000011001	-4		175	11000110000110	-2
	176	00011000000111	-4		176	11000110001100	-2
45	177	00011111100000	-2		177	11000110011000	-2
	178	00011111000001	-2		178	11000111000001	-2
	179	00011110011000	-2		179	11000111100000	-2
	180	00011110001100	-2		180	11001100000011	-2
	181	00011110000110	-2		181	11001100000110	-2
	182	00011110000011	-2		182	11001100001100	-2
50	183	00011100111000	-2		183	11001100011000	-2
	184	00011100110001	-2		184	11001100110000	-2
	185	00011100011100	-2		185	11001110000001	-2
	186	00011100011001	-2		186	11001111000000	-2
	187	00011100001110	-2		187	11000000011001	-4
	188	00011100000111	-2		188	11000000011100	-4
	189	00011001111000	-2		189	11000000110001	-4
55	190	00011001110001	-2		190	11000000111000	-4
	191	00011001100110	-2		191	11000001100001	-4



Tabelle 5 (CDS ≤ 0)

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5							
	192	00011001100011	-2		192	11000001110000	-4
	193	00011000111100	-2		193	11000011000001	-4
	194	00011000111001	-2		194	11000011100000	-4
	195	00011000110011	-2		195	11000110000001	-4
	196	00011000011110	-2		196	11000111000000	-4
10	197	00011000001111	-2	2(D)	197	11001100000001	-4
	198	00011111110000	0		198	11100000001111	0
	199	00011111100001	0		199	11100000011110	0
	200	00011110011000	0		200	11100000110011	0
	201	00011110001100	0		201	11100000111001	0
	202	00011110000011	0		202	11100000111100	0
15	203	00011110011100	0		203	11100001100011	0
	204	00011110011001	0		204	11100001100110	0
	205	00011110001110	0		205	11100001110001	0
	206	00011110000111	0		206	11100001111000	0
	207	00011100111100	0		207	11100011000011	0
	208	00011100111001	0		208	11100011000110	0
	209	00011100110011	0		209	11100011001100	0
20	210	00011100011110	0		210	11100011100001	0
	211	00011100001111	0		211	11100011110000	0
	212	00011001111100	0		212	11100110000011	0
	213	00011001111001	0		213	11100110000110	0
	214	00011001110011	0		214	11100110001100	0
	215	00011001100111	0	3(D)	215	11100110011000	0
25	216	00011000111110	0		216	11100111000001	0
	217	00011000011111	0		217	11100111100000	0
	218	00001110000011	-4		218	11100000001110	-2
	219	00001100000011	-4		219	11100000011001	-2
	220	00001111110000	-2		220	11100000011100	-2
30	221	00001111100001	-2		221	11100000110001	-2
	222	00001111001100	-2		222	11100000111000	-2
	223	00001111000110	-2		223	11100001100001	-2
	224	00001111000011	-2		224	11100001110000	-2
	225	00001110011100	-2		225	11100011000001	-2
	226	00001110011001	-2		226	11100011100000	-2
	227	00001110001110	-2		227	11100110000001	-2
35	228	00001110000111	-2		228	11100111000000	-2
	229	00001100111100	-2		229	11100000001100	-4
	230	00001100111001	-2		230	11100000011000	-4
	231	00001100110011	-2		231	11100000110000	-4
	232	00001100011110	-2		232	11100001100000	-4
	233	00001100001111	-2		233	11100011000000	-4
40	234	00001111111000	0		234	11110000000111	0
	235	00001111110001	0		235	11110000001110	0
	236	00001111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	00001111001110	0		238	11110000110001	0
	239	00001111000111	0		239	11110000111000	0
	240	00001110011110	0		240	11110001100001	0
45	241	00001110001111	0		241	11110001110000	0
	242	00001100111110	0	4(D)	242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00001111111000	-2		244	11110000000110	-2
	245	00001111100001	-2		245	11110000001100	-2
	246	00001111000110	-2		246	11110000011000	-2
	247	00001111000011	-2		247	11110000110000	-2
50	248	00001110001111	-2		248	11110001100000	-2
	249	00001100011111	-2		249	11110011000000	-2
	250	00001111111000	0		250	11111000000011	0
	251	00001111110001	0		251	11111000000110	0
	252	00001111100110	0	5(D)	252	11111000001100	0
	253	00001111000111	0		253	11111000011000	0
	254	00001110011111	0		254	11111000110000	0
55	255	00001100111111	0		255	11111001100000	0

Tabelle 12

5	<b>8-Bit-Datenwert</b>	<b>Modulationscode</b>	<b>CDS</b>
	248	11111000110001	2
10	249	11111000111000	2
	250	11111001100001	2
15	251	11111001110000	2

Tabelle 13

20	<b>8-Bit-Datenwert</b>	<b>Modulationscode</b>	<b>CDS</b>
	248	00000111001110	-2
25	249	00000111000111	-2
	250	00000110011110	-2
30	251	00000110001111	-2

- 35 5. Digitales Modulationsverfahren zum Umsetzen von digitalen 8-Bit-Daten in digitale 14-Bit-Modulationscodes, welches
- einen Schritt 1 zum Wählen von bis zu vier digitalen 14-Bit-Modulationscodes für jeden digitalen 8-Bit-Datenwert, wobei der digitale 14-Bit-Modulationscode durch Prozeduren gewählt wird, bei denen
- 40 (a) aus den  $2^{14}$  digitalen 14-Bit-Codes ein digitaler Code gewählt wird, in welchem die Anzahl von aufeinanderfolgenden identischen Bits in den ersten 7 Bits 6 oder weniger, von dem zweiten Bit bis zu dem 13. Bit 2 bis 7 und in den letzten 6 Bits 5 oder weniger beträgt, und diese Wählprozedur wiederholt wird,
- (b) aus den bei der Prozedur (a) gewählten digitalen 14-Bit-Codes ein digitaler Code gewählt wird, dessen erstes Bit "0" ist und dessen Codewortsumme CDS einen absoluten Wert gleich 6 oder weniger hat, und diese Wählprozedur wiederholt wird,
- 45 (c) aus den bei der Prozedur (a) gewählten digitalen 14-Bit-Codes ein digitaler Code gewählt wird, dessen erstes Bit "1" ist und dessen Codewortsumme CDS einen absoluten Wert gleich 4 oder weniger hat, und diese Wählprozedur wiederholt wird,
- (d) aus den bei der Prozedur (b) gewählten digitalen 14-Bit-Codes ein digitaler Code gewählt wird, dessen Wert der Codewortsumme CDS 0 ist, der gewählte digitale 14-Bit-Code mit dessen Umkehrcode zu einem Paar zusammengefaßt wird, um aus den beiden digitalen Codes eine Gruppe zu bilden, und diese Wählprozedur wiederholt wird,
- 50 (e) aus den bei der Prozedur (b) gewählten digitalen 14-Bit-Codes ein digitaler Code gewählt wird, dessen Wert der Codewortsumme CDS +2, +4 oder +6 ist, außer den bei der Prozedur (c) gewählten digitalen 14-Bit-Codes ein digitaler Code gewählt wird, dessen Wert der Codewortsumme CDS +2 oder
- 55 +4 ist, die beiden gewählten digitalen 14-Bit-Codes mit deren Umkehrcodes kombiniert werden, um aus den 4 digitalen Codes eine Gruppe zu bilden, und diese Wählprozedur wiederholt wird, und
- (f) aus den bei den vorangehenden Prozeduren gebildeten Gruppen 256 Gruppen als digitale 14-Bit-

Modulationscodes gewählt werden,

einen Schritt 2 zum Wählen einer Gruppe von digitalen 14-Bit-Modulationscodes aus den 256 Gruppen der digitalen 14-Bit-Modulationscodes, wobei die gewählte Gruppe dem eingegebenen digitalen 8-Bit-Datenwert entspricht,

5 einen Schritt 3 zum weiteren Wählen von mindestens einem digitalen 14-Bit-Modulationscode in der bei dem Schritt 2 gewählten Gruppe, wobei der jeweilige digitale 14-Bit-Modulationscode der Erfordernis genügt, daß an dem Anschlußabschnitt des schon gewählten vorangehenden digitalen 14-Bit-Modulationscodes und des zu wählenden digitalen 14-Bit-Modulationscodes die Anzahl von aufeinanderfolgenden identischen Bits 2 bis 7 ist, und

10 einen Schritt 4 zum weiteren Wählen eines digitalen 14-Bit-Modulationscodes aus den bei dem Schritt 3 gewählten Modulationscodes in der Weise umfaßt, daß dieser eine digitale 14-Bit-Modulationscode der Erfordernis genügt, daß der Absolutwert des digitalen Bit-Summenwertes DSV für jedes Bit in dem Modulationscode gleich 8 oder weniger ist.

15 6. Digitales Modulationsverfahren nach Anspruch 5, bei dem der Schritt 3 Prozeduren umfaßt, bei denen dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "10" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "01", "001", "0001", "00001", "000001" oder "0000001" sind,

20 dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "01" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "10", "110", "1110", "11110", "111110" oder "1111110" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "100" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110", "1111110", "01", "001", "0001", "00001" oder "000001" sind,

25 dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "011" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001", "0000001", "10", "110", "1110", "11110" oder "111110" sind,

30 dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "1000" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110", "1111110", "01", "001", "0001" oder "00001" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "0111" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001", "0000001", "10", "110", "1110" oder "11110" sind,

35 dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "10000" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110", "1111110", "01", "001", "110", "1110", "11110", "111110", "1111110", "01", "001" oder "0001" sind,

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "01111" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001", "0000001", "10", "110" oder "1110" sind,

40 dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "100000" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "110", "1110", "11110", "111110", "1111110", "01" oder "001" sind, und

dann, wenn der schon gewählte vorangehende digitale Modulationscode mit "011111" endet, irgendeiner der digitalen Modulationscodes gewählt wird, dessen erste Bits "001", "0001", "00001", "000001", "0000001", "10", "110" oder "1110" sind.

7. Digitales Modulationsverfahren nach Anspruch 5, bei dem der Schritt 4 Prozeduren umfaßt, bei denen dann, wenn der digitale Summenwert DSV an dem Ende des schon gewählten vorangehenden digitalen 14-Bit-Codes +4 oder +2 ist, irgendeiner der digitalen Modulationscodes gewählt wird, dessen Codewortsumme CDS 0, -2, -4 oder -6 ist,

50 dann, wenn der digitale Summenwert DSV an dem Ende des schon gewählten vorangehenden digitalen 14-Bit-Modulationscodes 0 ist, irgendeiner der digitalen Modulationscodes gewählt wird, dessen Codewortsumme CDS +4, +2, 0, -2 oder -4 ist, und

55 dann, wenn der digitale Summenwert DSV an dem Ende des schon gewählten vorangehenden digitalen 14-Bit-Modulationscodes -2 oder -4 ist, irgendeiner der digitalen Modulationscodes gewählt wird, dessen Codewortsumme CDS +6, +4, +2, oder 0 ist.

8. Digitales Modulationsverfahren nach Anspruch 5, bei dem die digitalen Modulationscodes die in den nach-

stehenden Tabellen 17 und 18 aufgeführten Codes sind.

Tabelle 17 (CDS  $\geq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5							
10							
15							
20							
25	1 (A)			1 (B)			
30							
35							
40							
45							
50							
55							

Tabelle 17 (CDS  $\geq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5		67 01111000011110	2		67 10011000111110	2	
		68 01111000001111	2		68 10011001100111	2	
		69 01110011111000	2		69 10011001110011	2	
10		70 01110011110001	2		70 10011001111001	2	
		71 01110011100110	2		71 10011001111100	2	
		72 01110011100011	2		72 10011000011111	2	
		73 01110011001110	2		73 10011000111110	2	
		74 01110011000111	2		74 10011001100111	2	
		75 01110001111100	2		75 10011001100110	2	
		76 01110001111001	2		76 10011001111100	2	
		77 01110001110011	2	1 (B)	77 10011100001111	2	
15		78 01110001100111	2		78 10011100011110	2	
		79 01110000111110	2		79 10011100110011	2	
		80 01110000011111	2		80 10011100111100	2	
		81 01100111111000	2		81 10011110000111	2	
		82 01100111110001	2		82 10011111000110	2	
		83 01100111100110	2		83 10011110011001	2	
		84 01100111100011	2		84 10011111000011	2	
20	1 (A)	85 01100111001110	2		85 10011111100000	2	
		86 01100111000111	2		86 10011111000111	4	
		87 01100110011110	2		87 11000011111110	4	
		88 01100110001111	2		88 11000110011111	4	
		89 01100011111100	2		89 11000110011111	4	
		90 01100011111001	2		90 11000111100111	4	
		91 01100011110011	2		91 11000111110011	4	
25		92 01100011100111	2		92 11000111111001	4	
		93 01100011001111	2		93 11000111111100	4	
		94 01100001111110	2		94 11001100011111	4	
		95 01111111001100	4		95 11001100111110	4	
		96 01111111000110	4		96 11001110001111	4	
		97 01111111000011	4		97 11001110011110	4	
		98 01111111001110	4		98 11001111000111	4	
		99 011111110011001	4		99 11001111001110	4	
30		100 011111110001110	4		100 11001111100011	4	
		101 011111110000111	4		101 11000001111110	2	
		102 011111100111100	4		102 11000011001111	2	
		103 011111100111001	4		103 11000011100111	2	
		104 011111100110011	4		104 11000011110011	2	
		105 011111100011110	4		105 11000011111001	2	
35		106 011111100001111	4	2 (B)	106 11000011111100	2	
		107 011110011111100	4		107 11000110001111	2	
		108 011110011111001	4		108 11000110011110	2	
		109 011110011100111	4		109 11000110001111	2	
		110 01111001100111	4		110 11000110011110	2	
		111 01111000111110	4		111 11000111000111	2	
		112 01111000011111	4		112 11000111100110	2	
		113 01110011111100	4		113 11000111110001	2	
		114 01110011111001	4		114 11000111111000	2	
40		115 01110011110011	4		115 11001100001111	2	
		116 01110011100111	4		116 11001100011110	2	
		117 01110011001111	4		117 11001100110011	2	
		118 01110001111110	4		118 11001100111001	2	
		119 01100111111100	4		119 11001100111100	2	
		120 01100111111001	4		120 11001110000111	2	
45		121 01100111110011	4		121 11001110001110	2	
		122 01100111100111	4		122 11001110011001	2	
		123 01100111001111	4		123 11001110011100	2	
		124 01100110011111	4		124 11001111000011	2	
		125 01100011111110	4		125 11001111000110	2	
		126 01111111000111	6		126 11001111001100	2	
		127 01111111000111	6		127 11001111100001	2	
		128 01111100011111	6		128 11001111110000	2	
50	2 (A)	129 00111111100000	0		129 11000000011111	0	
		130 00111111000001	0		130 11000000111110	0	
		131 001111110011000	0		131 11000001100111	0	
		132 001111110001100	0		132 11000001110011	0	
		133 001111110000110	0		133 11000001111001	0	

Tabelle 17 (CDS  $\geq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5							
10							
15							
20							
25							
30							
35							
40							
45							
50							

2 (A)	134	00111110000011	0	2 (B)	134	11000001111100	0
	135	00111100111000	0		135	11000011000111	0
	136	00111100110001	0		136	11000011001110	0
	137	00111100011100	0		137	11000011100011	0
	138	00111100011001	0		138	11000011100110	0
	139	00111100001110	0		139	11000011110001	0
	140	00111100000111	0		140	11000011111000	0
	141	00111001111000	0		141	11000110000111	0
	142	00111001110001	0		142	11000110001110	0
	143	00111001100110	0		143	11000110011001	0
	144	00111001100011	0		144	11000110011100	0
	145	00111000111100	0		145	11000111000011	0
	146	00111000111001	0		146	11000111000110	0
	147	00111000110011	0		147	11000111001100	0
	148	00111000011110	0		148	11000111100001	0
	149	00111000001111	0		149	11000111110000	0
	150	00110011111000	0		150	11001100000111	0
	151	00110011110001	0		151	11001100001110	0
	152	00110011100110	0		152	11001100011001	0
	153	00110011100011	0		153	11001100011100	0
	154	00110011001110	0		154	11001100110001	0
2 (A)	155	00110011000111	0		155	11001100111000	0
	156	00110001111100	0		156	11001110000011	0
	157	00110001111001	0		157	11001110000110	0
	158	00110001110011	0		158	11001110001100	0
	159	00110001100111	0		159	11001110011000	0
	160	00110000111110	0		160	11001111000001	0
	161	00110000011111	0		161	11001111100000	0
	162	00111111100001	2		162	11001111100110	4
	163	00111111100110	2		163	11001111110001	4
	164	00111111100110	2		164	11001111111000	4
	165	00111111100011	2	3 (B)	165	11100001111110	4
	166	00111111100110	2		166	11100011001111	4
	167	001111110011001	2		167	11100011100111	4
	168	001111110001110	2		168	11100011110011	4
	169	001111110000111	2		169	11100011111001	4
	170	001111100111100	2		170	11100011111100	4
	171	001111100111001	2		171	11100110001111	4
	172	001111100110011	2		172	11100110011110	4
	173	001111100011110	2		173	11100111000111	4
	174	001111100001111	2		174	11100111001110	4
	175	001111001111100	2		175	11100111100011	4
	176	001111001111001	2		176	11100111100110	4
	177	001111001110011	2		177	11100111110001	4
	178	001111001100111	2		178	11100111111000	4
	179	00111000111110	2		179	11100000011111	2
	180	00111000011111	2		180	11100000111110	2
	181	00110011111100	2		181	11100001100111	2
	182	00110011111001	2		182	11100001110011	2
	183	00110011110011	2		183	11100001111001	2
	184	00110011100111	2		184	11100001111100	2
2 (A)	185	00110011001111	2		185	11100011000111	2
	186	00110001111110	2		186	11100011001110	2
	187	00111111100110	4		187	11100011100011	2
	188	00111111100011	4		188	11100011100110	2
	189	00111111001110	4		189	11100011110001	2
	190	00111111000111	4		190	11100011111000	2
	191	00111111001110	4		191	11100110000111	2
	192	00111111000111	4		192	11100110001110	2
	193	00111100111110	4		193	11100110011001	2
	194	00111100011111	4		194	11100110011100	2
	195	00111001111110	4		195	11100111000011	2
	196	00110011111110	4		196	11100111000110	2
	197	00111111100111	6		197	11100111001100	2
	198	00111111001111	6		198	11100111100001	2
	199	00111110011111	6		199	11100111110000	2

Tabelle 17 (CDS  $\geq 0$ )

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
3 (A)	200	0001111110000	0	3 (B)	200	1110000000111	0
	201	0001111110001	0		201	1110000001110	0
	202	000111111001100	0		202	11100000110011	0
	203	000111111000110	0		203	11100000111001	0
	204	000111111000011	0		204	11100000111100	0
	205	0001111110011100	0		205	11100001100011	0
	206	0001111110011001	0		206	11100001100110	0
	207	0001111110001110	0		207	11100001110001	0
	208	0001111110000111	0		208	11100001111000	0
	209	000111100111100	0		209	11100011000011	0
3 (A)	210	000111100111001	0	3 (B)	210	11100011000110	0
	211	000111100110011	0		211	11100011001100	0
	212	000111100011110	0		212	11100011100001	0
	213	000111100001111	0		213	11100011110000	0
	214	000110011111100	0		214	11100110000011	0
	215	00011001111001	0		215	11100110000110	0
	216	00011001110011	0		216	11100110001100	0
	217	00011001100111	0		217	11100110011000	0
	218	00011000111110	0		218	11100111000001	0
	219	00011000011111	0		219	11100111100000	0
3 (A)	220	00011111110001	2	4 (B)	220	11110000001111	2
	221	000111111100110	2		221	11110000011110	2
	222	000111111100011	2		222	11110000110011	2
	223	000111111001110	2		223	11110000111001	2
	224	000111111000111	2		224	11110000111100	2
	225	000111100111110	2		225	11110001100011	2
	226	000111100011111	2		226	11110001100110	2
	227	000111100111110	2		227	11110001110001	2
	228	000111100011111	2		228	11110001111000	2
	229	000110011111110	2		229	11110011000011	2
4 (A)	230	00011111110011	4	4 (B)	230	11110011000110	2
	231	00011111100111	4		231	11110011001100	2
	232	00011111100111	4		232	11110011100001	2
	233	00011110011111	4		233	11110011110000	2
	234	00001111111000	0		234	11110000000111	0
	235	000011111110001	0		235	11110000001110	0
	236	000011111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	000011111001110	0		238	11110000110001	0
	239	000011111000111	0		239	11110000111000	0
4 (A)	240	000011100111110	0	5 (B)	240	11110001100001	0
	241	000011100011111	0		241	11110001110000	0
	242	000011001111110	0		242	11110011000001	0
	243	000011000111111	0		243	11110011100000	0
	244	00001111111001	2		244	11111000000111	2
	245	000011111110011	2		245	11111000011100	2
	246	00001111100111	2		246	11111000110001	2
	247	00001111001111	2		247	11111000111000	2
	248	00001110011111	2		248	11111001110000	2
	249	00000111111100	0		249	11111000000011	0
5 (A)	250	00000111111001	0	5 (B)	250	11111000000110	0
	251	00000111110011	0		251	11111000001100	0
	252	00000111100111	0		252	11111000011000	0
	253	00000111001111	0		253	11111000110000	0
	254	00000110011111	0		254	11111001100000	0
	255	00000011111110	0		255	11111100000001	0

Tabelle 18 (CDS ≤ 0)

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5		0 0111110000001	0		0 1000000111110	0	
		1 0111110011000	0		1 1000001100111	0	
		2 0111110001100	0		2 1000001110011	0	
		3 0111110000110	0		3 1000001111001	0	
		4 0111110000010	0		4 1000001111100	0	
10		5 0111110000001	0		5 1000001111100	0	
		6 0111100111000	0		6 1000011000111	0	
		7 0111100110000	0		7 1000011001110	0	
		8 0111100011100	0		8 1000011000111	0	
		9 0111100011000	0		9 1000011001110	0	
		10 0111100011100	0		10 1000011110001	0	
		11 0111100011001	0		11 1000011110010	0	
15		12 0111100000110	0		12 1000011111000	0	
		13 0111100000011	0		13 1000011111100	0	
		14 0111001111000	0		14 1000110000111	0	
		15 0111001110000	0		15 1000110001110	0	
		16 0111001100110	0		16 1000110011001	0	
		17 0111001100010	0		17 1000110011001	0	
		18 0111001100001	0		18 1000110011100	0	
		19 0111000111100	0		19 1000111000011	0	
20		20 0111000111000	0		20 1000111000110	0	
		21 0111000110010	0		21 1000111001100	0	
		22 0111000110001	0		22 1000111001100	0	
		23 0111000011110	0		23 1000111100001	0	
		24 0111000011100	0		24 1000111100010	0	
		25 0111000011001	0		25 1000111100110	0	
25	1 (C)	26 0111000011110	0	1 (D)	26 1000111110000	0	
		27 0111000000111	0		27 1000111111000	0	
		28 0110011111000	0		28 1001100000111	0	
		29 0110011110000	0		29 1001100001110	0	
		30 0110011100110	0		30 1001100011001	0	
		31 0110011100010	0		31 1001100011001	0	
		32 0110011100001	0		32 1001100011100	0	
		33 0110011001110	0		33 1001100110001	0	
30		34 0110011001100	0		34 1001100110010	0	
		35 0110011000110	0		35 1001100110001	0	
		36 0110011000011	0		36 1001100111000	0	
		37 0110001111100	0		37 1001110000011	0	
		38 0110001111000	0		38 1001110000110	0	
		39 0110001110010	0		39 1001110001100	0	
		40 0110001110001	0		40 1001110001100	0	
		41 0110001100110	0		41 1001110011000	0	
35		42 0110001100011	0		42 1001110011100	0	
		43 0110000111100	0		43 1001111000001	0	
		44 0110000111001	0		44 1001111000010	0	
		45 0110000111001	0		45 1001111000110	0	
		46 0110000110011	0		46 1001111001100	0	
		47 0110000011110	0		47 1001111100001	0	
		48 0110000001111	0		48 1001111110000	0	
40		49 0111110000000	-2		49 1000000011110	-2	
		50 0111110011000	-2		50 1000000110011	-2	
		51 0111110001100	-2		51 1000000111001	-2	
		52 0111110000110	-2		52 1000000111100	-2	
		53 0111110000010	-2		53 1000001100011	-2	
		54 0111110000001	-2		54 1000001100110	-2	
		55 0111100011000	-2		55 1000001110001	-2	
45		56 0111001110000	-2		56 1000001110001	-2	
		57 0111001100000	-2		57 1000001110010	-2	
		58 0111000111000	-2		58 1000001111000	-2	
		59 0111000110001	-2		59 1000011000011	-2	
		60 0111000011100	-2		60 1000011000110	-2	
		61 0111000011001	-2		61 1000011001100	-2	
		62 0111000001110	-2		62 1000011001100	-2	
		63 0111000001101	-2		63 1000011001100	-2	
50		64 0111000000110	-2		64 1000011100001	-2	
		65 0111000000011	-2		65 1000011100010	-2	
		66 0110011110000	-2		66 1000011100110	-2	



55

Tabelle 18 (CDS ≤ 0)

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
5							
10		133 00111110000110 0			133 11000001111001 0		
		134 00111110000011 0			134 11000001111100 0		
		135 001111100111000 0			135 11000011000111 0		
		136 001111100110001 0			136 11000011001110 0		
		137 001111100111100 0			137 1100001100011 0		
		138 001111100011001 0			138 1100001100110 0		
		139 001111100001110 0			139 1100001110001 0		
		140 001111100000111 0			140 1100001111000 0		
		141 00111001111000 0			141 11000110000111 0		
		142 00111001110001 0			142 11000110001110 0		
		143 00111001100110 0			143 11000110011001 0		
		144 00111001100011 0			144 11000110011100 0		
15		145 00111000111100 0			145 11000111000011 0		
		146 00111000111001 0			146 11000111000110 0		
		147 00111000110011 0			147 11000111001100 0		
		148 00111000011110 0			148 11000111100001 0		
		149 00111000001111 0			149 11000111110000 0		
		150 00110011111000 0			150 11001100000111 0		
		151 00110011110001 0			151 11001100001110 0		
20		152 00110011100110 0			152 11001100011001 0		
		153 00110011100011 0			153 11001100011100 0		
		154 00110011001110 0			154 11001100110001 0		
		155 00110011000111 0			155 11001100011000 0		
		156 00110001111100 0			156 11001110000011 0		
		157 00110001111001 0			157 11001110000110 0		
		158 00110001110011 0			158 11001110001100 0		
25		159 00110001100111 0			159 11001110011000 0		
		160 00110000111110 0			160 11001111000001 0		
		161 00110000011111 0			161 11001111100000 0		
		162 00110000011001 -4			162 11000000011110 -2		
		163 00110000001110 -4			163 11000000110011 -2		
		164 00110000000111 -4			164 11000000111001 -2		
		165 00011110000001 -4			165 11000000111100 -2		
30		166 00011110011000 -4			166 11000001100011 -2		
		167 000111100011000 -4			167 11000001100110 -2		
		168 000111100001100 -4			168 11000001110001 -2		
		169 000111100000110 -4			169 11000001111000 -2		
		170 000111100000011 -4			170 11000011000011 -2		
		171 00011001110000 -4			171 11000011000110 -2		
		172 00011001100001 -4			172 11000011001100 -2		
		173 00011000111000 -4			173 11000011100001 -2		
35		174 00011000110001 -4			174 11000011110000 -2		
		175 00011000011100 -4			175 11000110000011 -2		
		176 00011000011001 -4			176 11000110000110 -2		
		177 00011000001110 -4			177 11000110001100 -2		
		178 00011000000111 -4			178 11000110011000 -2		
		179 00011111100000 -2			179 11000111000001 -2		
		180 00011111000001 -2			180 11000111100000 -2		
40		181 00011110011000 -2			181 11001100000011 -2		
		182 00011110001100 -2			182 11001100000110 -2		
		183 00011110000110 -2			183 11001100001100 -2		
		184 00011110000011 -2			184 11001100011000 -2		
		185 00011100111000 -2			185 11001100110000 -2		
		186 00011100110001 -2			186 11001110000001 -2		
		187 00011100011100 -2			187 11000000011001 -4		
		188 00011100011001 -2			188 11000000011100 -4		
45		189 00011100001110 -2			189 110000000110001 -4		
		190 00011100000111 -2			190 11000000111000 -4		
		191 00011001111000 -2			191 11000001100001 -4		
		192 00011001110001 -2			192 11000001110000 -4		
		193 00011001100110 -2			193 11000011000001 -4		
		194 00011001100011 -2			194 11000011100000 -4		
		195 00011000111100 -2			195 11000110000001 -4		
50		196 0001100011001 -2			196 11001100000001 -4		
		197 00011000110011 -2			197 11000000011000 -6		
		198 00011000011110 -2			198 11000000110000 -6		
		199 00011000001111 -2			199 11000001100000 -6		

Tabelle 18 (CDS ≤ 0)

Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "0"	CDS	Klasse	8-Bit-Daten	Modulationscodes, beginnend mit "1"	CDS
3 (C)	200	0001111110000	0	3 (D)	200	1110000000111	0
	201	0001111110001	0		201	1110000001110	0
	202	000111111001100	0		202	11100000110011	0
	203	000111111000110	0		203	11100000111001	0
	204	000111111000011	0		204	11100000111100	0
	205	000111110011100	0		205	11100001100011	0
	206	000111110011001	0		206	11100001100110	0
	207	000111110001110	0		207	11100001110001	0
	208	000111110000111	0		208	11100001111000	0
	209	00011100111100	0		209	11100011000011	0
	210	00011100111001	0		210	11100011000110	0
	211	00011100110011	0		211	11100011001100	0
	212	00011100011110	0		212	11100011100001	0
	213	00011100001111	0		213	11100011110000	0
	214	00011001111100	0		214	11100110000011	0
	215	00011001111001	0		215	11100110000110	0
	216	00011001110011	0		216	11100110001100	0
	217	00011001100111	0		217	11100110011000	0
	218	00011000111110	0		218	11100111000001	0
	219	00011000011111	0		219	11100111100000	0
4 (C)	220	00001111110000	-2	4 (D)	220	11100000001110	-2
	221	00001111100001	-2		221	11100000011001	-2
	222	000011111001100	-2		222	11100000011100	-2
	223	000011111000110	-2		223	11100000110001	-2
	224	000011111000011	-2		224	11100000111000	-2
	225	00001110011100	-2		225	11100001100001	-2
	226	00001110011001	-2		226	11100001110000	-2
	227	00001110001110	-2		227	11100011000001	-2
	228	00001110000111	-2		228	11100011100000	-2
	229	00001100111100	-2		229	11100110000001	-2
	230	00001100111001	-2		230	11100000001100	-4
	231	00001100110011	-2		231	11100000011000	-4
	232	00001100011110	-2		232	11100000110000	-4
	233	00001100001111	-2		233	11100001100000	-4
5 (C)	234	00001111110000	0	5 (D)	234	11110000000111	0
	235	00001111110001	0		235	11110000001110	0
	236	00001111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	00001111001110	0		238	11110000110001	0
	239	00001111000111	0		239	11110000111000	0
	240	00001110011110	0		240	11110001100001	0
	241	00001110001111	0		241	11110001110000	0
	242	00001100111110	0		242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00000111111000	-2		244	11110000000110	-2
6 (C)	245	00000111100011	-2	6 (D)	245	11110000001100	-2
	246	00000111001110	-2		246	11110000011000	-2
	247	00000111000111	-2		247	11110000110000	-2
	248	00000110001111	-2		248	11110001100000	-2
	249	00000111111000	0		249	11111000000011	0
	250	00000111110001	0		250	11111000000110	0
	251	00000111110011	0		251	11111000001100	0
	252	00000111100111	0		252	11111000011000	0
7 (C)	253	00000111001111	0	7 (D)	253	11111000110000	0
	254	00000110011111	0		254	11111001100000	0
	255	00000011111110	0		255	11111100000001	0

## Revendications

1. Un procédé de modulation numérique pour convertir des données numériques à 8 bits en codes de modulation numériques à 14 bits, ce procédé de modulation numérique étant caractérisé en ce qu'il comprend :

une étape 1 pour sélectionner jusqu'à quatre codes de modulation numériques à 14 bits pour chaque donnée numérique à 8 bits, le code de modulation numérique à 14 bits étant sélectionné par les procédures suivantes :

- (a) on sélectionne parmi les  $2^{14}$  codes numériques à 14 bits un code numérique dans lequel les nombres de bits identiques consécutifs sont égaux à 5 ou moins dans les 6 premiers bits, à 2 à 7 du second bit

au 13-lème bit, et à 6 ou moins dans les 7 derniers bits, la valeur absolue de la CDS (somme numérique de mot de code) du code numérique sélectionné étant égale à 4 ou moins, et on répète cette procédure de sélection,

- 5 (b) on sélectionne parmi les codes numériques à 14 bits sélectionnés dans la procédure (a), un code numérique dont le premier bit est "0", et dont la valeur de CDS est 0, et on combine le code numérique à 14 bits sélectionné avec son code inversé, pour former un groupe avec les 2 codes numériques, ou bien on sélectionne parmi les codes numériques à 14 bits sélectionnés à la procédure (a), un code numérique dont le premier bit est "1", et dont la valeur de CDS est égale à +2 ou +4, on combine les codes numériques à 14 bits sélectionnés avec leurs codes inversés, et on combine en outre les deux codes
- 10 numériques à 14 bits avec une paire de codes numériques à 14 bits sélectionnés à la procédure ci-dessus, pour former un groupe avec les 4 codes numériques, et on répète cette procédure de sélection, (c) on sélectionne parmi les codes numériques à 14 bits sélectionnés à la procédure (a), un code numérique dont le premier bit est "0", et dont la valeur de CDS est égale à +2, et un autre code numérique dont le premier bit est "1", et dont la valeur de CDS est égale à +2 ou +4, et on combine les deux codes
- 15 numériques à 14 bits sélectionnés avec leurs codes inversés, pour former un groupe avec les 4 codes numériques, et on répète cette procédure de sélection, (d) on sélectionne parmi les codes numériques à 14 bits sélectionnés à la procédure (a), un code numérique dont le premier bit est "0", et dont la valeur de CDS est égale à +4, et un autre code numérique dont le premier bit est "1" et dont la valeur de CDS est égale à +2, et on combine les deux
- 20 codes numériques à 14 bits sélectionnés avec leurs codes inversés, pour former un groupe avec les 4 codes numériques, et on répète cette procédure de sélection, et (e) on sélectionne pour les codes de modulation numériques à 14 bits 256 groupes parmi les groupes formés dans les procédures ci-dessus;

25 une étape 2 pour sélectionner un groupe de codes de modulation numériques à 14 bits parmi les 256 groupes de codes de modulation numériques à 14 bits, le groupe sélectionné correspondant à une donnée numérique à 8 bits appliquée en entrée;

une étape 3 pour sélectionner en outre un ou plusieurs codes de modulation numériques à 14 bits dans le groupe sélectionné à l'étape 2, chacun des codes de modulation numériques à 14 bits satisfaisant l'exigence selon laquelle le nombre de bits identiques consécutifs dans la partie de jonction du code de modulation numérique à 14 bits précédent déjà sélectionné et du code de modulation numérique à 14 bits à sélectionner, doit avoir l'une des valeurs 2 à 7; et

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une étape 4 pour sélectionner en outre un code de modulation numérique à 14 bits parmi les codes de modulation sélectionnés à l'étape 3, de façon que ce code de modulation numérique à 14 bits particulier satisfasse l'exigence selon laquelle la valeur absolue de la DSV (valeur de somme numérique) de bit, pour chaque bit dans le code de modulation, doit être inférieure ou égale à 7.

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2. Un procédé de modulation numérique selon la revendication 1, caractérisé en ce que l'étape 3 comprend les procédures suivantes :

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "01", "001", "0001", "00001" et "000001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "10";

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on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "10", "110", "1110", "11110" et "111110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "01";

45 on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110" "01", "001", "0001", "00001", et "000001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "100";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001", "10", "110", "1110", "11110", et "111110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "011";

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on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110", "01", "001", "0001" et "00001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "1000";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001", "10", "110", "1110" et "11110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "0111";

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on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110", "01", "001" et "0001" lorsque le code de modulation numérique précédent

qui a déjà été sélectionné se termine par "10000";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001", "10", "110" et "1110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "01111";

5 on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110", "01" et "001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "100000";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001", "10" et "110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "011111";

10 on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110", et "01" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "1000000"; et

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001" et "10" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "0111111".

3. Un procédé de modulation numérique selon la revendication 1, caractérisé en ce que l'étape 4 comprend les procédures suivantes :

20 on sélectionne l'un quelconque des codes de modulation numériques dont les CDS sont égales à 0, -2 et -4, lorsque la DSV à la fin du code de modulation numérique à 14 bits précédent qui a déjà été sélectionné est égale à +2;

on sélectionne l'un quelconque des codes de modulation numériques dont les CDS sont égales à +2, 0 et -2, lorsque la DSV à la fin du code de modulation numérique à 14 bits précédent qui a déjà été sélectionné est égale à 0; et

25 on sélectionne l'un quelconque des codes de modulation numériques dont les CDS sont égales à +4, +2 et 0 lorsque la DSV à la fin du code de modulation numérique à 14 bits précédent qui a déjà été sélectionné est égale à -2.

- 30 4. Un procédé de modulation numérique selon la revendication 1, caractérisé en ce que les codes de modulation numériques qui sont obtenus à l'étape 1 sont les codes indiqués dans les Tableaux 4 et 5 suivants, ou les codes obtenus en remplaçant une partie du Tableau 4 par le Tableau 12 suivant, ou les codes obtenus en remplaçant une partie du Tableau 5 par le Tableau 13 suivant.

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Tableau 4 (CDS  $\geq 0$ )

5	Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
		0	01111110000001	0		0	10000001111110	0
		1	01111100110000	0		1	10000011001111	0
10		2	01111100011000	0		2	10000011100111	0
		3	01111100001100	0		3	10000011110011	0
		4	01111100000110	0		4	10000011111001	0
		5	01111100000011	0		5	10000011111100	0
		6	01111001110000	0		6	10000110001111	0
		7	01111001100001	0		7	10000110011110	0
15		8	01111001110000	0		8	10000111000111	0
		9	01111000110001	0		9	10000111001110	0
		10	01111000011100	0		10	10000111100011	0
		11	01111000011001	0		11	10000111100110	0
		12	01111000001110	0		12	10000111110001	0
		13	01111000000111	0		13	10000111111000	0
20		14	01110011111000	0		14	10001100001111	0
		15	01110011100001	0		15	10001100011110	0
		16	01110011001100	0		16	10001100110011	0
		17	01110011000110	0		17	10001100111001	0
		18	01110011000011	0		18	10001100111100	0
		19	01110001111000	0		19	10001110000111	0
		20	01110001110001	0		20	10001110001110	0
25		21	01110001100110	0		21	10001110011001	0
		22	01110001100011	0		22	10001110011100	0
		23	01110000111100	0		23	10001111000011	0
		24	01110000111001	0		24	10001111000110	0
		25	01110000110011	0		25	10001111001100	0
		26	01110000011110	0		26	10001111100001	0
30		27	01110000001111	0		27	10001111110000	0
		28	01100111111000	0		28	10011000001111	0
		29	01100111100001	0		29	10011000011110	0
		30	01100111001100	0		30	10011000110011	0
		31	01100111000110	0		31	10011000111001	0
		32	01100111000011	0		32	10011000111100	0
35	1(A)	33	01100110011100	0	1(B)	33	10011001100011	0
		34	01100110011001	0		34	10011001100110	0
		35	01100110001110	0		35	10011001110001	0
		36	01100110000111	0		36	10011001111000	0
		37	01100011111000	0		37	10011100000111	0
		38	01100011110001	0		38	10011100001110	0
		39	01100011100110	0		39	10011100011001	0
40		40	01100011100011	0		40	10011100011100	0
		41	01100011001110	0		41	10011100110001	0
		42	01100011000111	0		42	10011100111000	0
		43	01100001111100	0		43	10011110000011	0
		44	01100001111001	0		44	10011110000110	0
		45	01100001110011	0		45	10011110001100	0
45		46	01100001100111	0		46	10011110011000	0
		47	01100000111110	0		47	10011111000001	0
		48	01100000011111	0		48	10011111100000	0
		49	01111111001100	4		49	10000011111110	2
		50	01111111000110	4		50	10000110011111	2
		51	01111111000011	4		51	10000111001111	2
50		52	01111111001100	4		52	10000111100111	2
		53	01111111001001	4		53	10000111110011	2
		54	01111111000110	4		54	10000111111001	2
		55	01111111000011	4		55	10000111111100	2
		56	01111100111100	4		56	10001100011111	2
		57	01111100111001	4		57	10001100111110	2
		58	01111100110011	4		58	10001110001111	2
55		59	01111100011110	4		59	10001110011110	2
		60	01111100001111	4		60	10001111000111	2
		61	01111001111100	4		61	10001111001110	2
		62	01111001111001	4		62	10001111100011	2
		63	01111001110011	4		63	10001111100110	2

Tableau 4 (CDS  $\geq 0$ )

	Classe	Données à 8 bits	Codes de modula- tion commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modula- tion commençant par "1"	CDS
5		64	01111001100111	4		64	10001111110001	2
		65	01111000111110	4		65	10001111111000	2
10		66	01111000011111	4		66	10011000011111	2
		67	01110011111100	4		67	10011000111110	2
		68	01110011111001	4		68	10011001100111	2
		69	01110011110011	4		69	10011001110011	2
		70	01110011100111	4		70	10011001111001	2
		71	01110011001111	4		71	10011001111100	2
15		72	01110001111110	4		72	10011100001111	2
		73	01110000111111	4		73	10011100011110	2
		74	01100111111100	4		74	10011100110011	2
		75	01100111111001	4		75	10011100111001	2
		76	01100111110011	4		76	10011100111100	2
		77	01100111100111	4		77	10011110000111	2
		78	01100111001111	4		78	10011110001110	2
20		79	01100110011111	4	1(8)	79	10011110011001	2
		80	01100011111110	4		80	10011110011100	2
		81	01111111000001	2		81	10011111000011	2
		82	01111110011000	2		82	10011111000110	2
		83	01111110001100	2		83	10011111001100	2
		84	01111110000110	2		84	10011111100001	2
		85	01111110000011	2		85	10011111100000	2
25		86	01111100111000	2		86	10001111001111	4
		87	01111100110001	2		87	10001111100111	4
		88	01111100011100	2		88	10001111110011	4
		89	01111100011001	2		89	10011001111110	4
		90	01111100001110	2		90	10011001111110	4
		91	01111100000111	2		91	10011110001111	4
30		92	011111001111000	2		92	10011110011110	4
		93	011111001110001	2		93	10011111000111	4
		94	011111001100110	2		94	10011111001110	4
		95	011111001100011	2		95	10011111100011	4
		96	011111000111100	2		96	10011111100110	4
	1(A)	97	011111000111001	2		97	11000111100111	4
35		98	011111000110011	2		98	11000111110011	4
		99	011111000011110	2		99	11000000111111	2
		100	011111000001111	2		100	11000001111110	2
		101	011100111111000	2		101	11000011001111	2
		102	01110011110001	2		102	11000011100111	2
		103	01110011100110	2		103	11000011110011	2
		104	01110011100011	2		104	11000011111001	2
40		105	01110011001110	2		105	11000011111100	2
		106	01110011000111	2		106	11000110001111	2
		107	01110001111100	2		107	11000110011110	2
		108	01110001111001	2		108	11000111000111	2
		109	01110001110011	2	2(8)	109	11000111001110	2
		110	01110001100111	2		110	11000111100011	2
45		111	01110000111110	2		111	11000111100110	2
		112	01110000011111	2		112	11000111110001	2
		113	01100111111000	2		113	11000111111000	2
		114	01100111110001	2		114	11001100001111	2
		115	01100111110010	2		115	11001100011110	2
		116	01100111100011	2		116	11001100110011	2
		117	01100111001110	2		117	11001100111001	2
50		118	01100111000111	2		118	11001100111100	2
		119	01100110011110	2		119	11001110000111	2
		120	01100110001111	2		120	11001110001110	2
		121	01100011111100	2		121	11001110011001	2
		122	01100011111001	2		122	11001110011100	2
		123	01100011110011	2		123	11001111000011	2
55		124	01100011100111	2		124	11001111000110	2
		125	01100011001111	2		125	11001111001100	2
		126	01100001111110	2		126	11001111100001	2
		127	01100000111111	2		127	11001111110000	2

Tableau 4 (CDS  $\geq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
5							
10		128 0011111100000	0		128 11000000011111	0	
		129 00111111000001	0		129 11000000111110	0	
		130 001111110011000	0		130 11000001100111	0	
		131 001111110001100	0		131 11000001110011	0	
		132 001111110000110	0		132 11000001111001	0	
		133 001111110000011	0		133 11000001111100	0	
		134 001111100111000	0		134 11000011000111	0	
		135 00111100110001	0		135 11000011001110	0	
		136 00111100011100	0		136 11000011100011	0	
15		137 00111100011001	0		137 11000011100110	0	
		138 00111100001110	0		138 11000011110001	0	
		139 00111100000111	0		139 11000011111000	0	
		140 00111001111000	0		140 11000110000111	0	
		141 00111001110001	0		141 11000110001110	0	
		142 00111001100110	0		142 11000110011001	0	
20		143 00111001100011	0	2(B)	143 11000110011100	0	
		144 00111000111100	0		144 11000111000011	0	
		145 00111000111001	0		145 11000111000110	0	
		146 00111000110011	0		146 11000111001100	0	
		147 00111000011110	0		147 11000111100001	0	
		148 00111000001111	0		148 11000111110000	0	
25		149 00110011111000	0		149 11001100000111	0	
		150 00110011110001	0		150 11001100001110	0	
		151 00110011100110	0		151 11001100011001	0	
		152 00110011100011	0		152 11001100011100	0	
		153 00110011001110	0		153 11001100110001	0	
		154 00110011000111	0		154 11001100111000	0	
30		155 00110001111100	0		155 11001110000011	0	
		156 00110001111001	0		156 11001110000110	0	
		157 00110001110011	0		157 11001110001100	0	
		158 00110001100111	0		158 11001110011000	0	
		159 00110000111110	0		159 11001111000001	0	
		160 00110000011111	0		160 11001111100000	0	
35	2(A)	161 00111111100001	2		161 11001100111110	4	
		162 001111111001100	2		162 11001110011110	4	
		163 00111111000110	2		163 11001111000111	4	
		164 00111111000011	2		164 11001111001110	4	
		165 00111111001100	2		165 11001111100011	4	
		166 001111110011001	2		166 11001111100110	4	
40		167 001111110001110	2		167 11100001111110	4	
		168 001111110000111	2		168 11100011100111	4	
		169 001111100111100	2		169 11100011110011	4	
		170 001111100111001	2		170 11100011111100	4	
		171 001111100110011	2		171 11100110011110	4	
		172 001111100011110	2		172 11100111000111	4	
		173 001111100001111	2	3(B)	173 11100111001110	4	
		174 001111001111100	2		174 11100111100011	4	
45		175 00111001111001	2		175 11100111100110	4	
		176 00111001110011	2		176 11100111111000	4	
		177 00111001100111	2		177 11100000011111	2	
		178 00111000111110	2		178 11100000111110	2	
		179 00111000011111	2		179 11100001100111	2	
50		180 00110011111100	2		180 11100001110011	2	
		181 00110011111001	2		181 11100001111001	2	
		182 00110011110011	2		182 11100001111100	2	
		183 00110011100111	2		183 11100011000111	2	
		184 00110011001111	2		184 11100011001110	2	
		185 00110001111110	2		185 11100011100011	2	
		186 00110000111111	2		186 11100011100110	2	
55		187 00111111100110	4		187 11100011110001	2	
		188 00111111100011	4		188 11100011111000	2	
		189 00111111001110	4		189 11100110000111	2	
		190 00111111000111	4		190 11100110001110	2	
		191 001111110011110	4		191 11100110011001	2	



Tableau 4 (CDS  $\geq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
2(A)	192	00111110001111	4		192	11100110011100	2
	193	00111110011110	4		193	11100111000011	2
	194	00111110001111	4		194	11100111000110	2
	195	00111001111110	4		195	11100111001100	2
	196	00111000111111	4		196	11100111100001	2
	197	00110011111110	4		197	11100111110000	2
	198	00011111110000	0		198	11100000001111	0
3(A)	199	00011111110000	0	3(B)	199	11100000001110	0
	200	000111111001100	0		200	11100000110011	0
	201	000111111000110	0		201	11100000111001	0
	202	00011111000011	0		202	11100000111100	0
	203	00011110011100	0		203	11100001100011	0
	204	00011110011001	0		204	11100001100110	0
	205	00011110001110	0		205	11100001110001	0
	206	00011110000111	0		206	11100001111000	0
	207	00011100111100	0		207	11100011000011	0
	208	00011100111001	0		208	11100011000110	0
	209	00011100110011	0		209	11100011001100	0
	210	00011100011110	0		210	11100011100001	0
	211	00011100001111	0		211	11100011110000	0
	212	00011001111100	0		212	11100110000011	0
	213	00011001111001	0		213	11100110000110	0
	214	00011001110011	0		214	11100110001100	0
	215	00011001100111	0		215	11100110011000	0
	216	00011000111110	0		216	11100111000001	0
	217	00011000011111	0		217	11100111100000	0
	218	00011111110001	2	4(B)	218	11110001111100	4
4(A)	219	00011111110010	2		219	11110011111000	4
	220	00011111110001	2		220	11110000001111	2
	221	000111111001110	2		221	11110000011110	2
	222	000111111000111	2		222	11110000110011	2
	223	000111110011110	2		223	11110000111001	2
	224	000111110001111	2		224	11110000111100	2
	225	00011100111110	2		225	11110001100011	2
	226	00011100011111	2		226	11110001100110	2
	227	00011001111110	2		227	11110001110001	2
	228	00011000111111	2		228	11110001111000	2
	229	00011111110011	4		229	11110011000011	2
	230	00011111100111	4		230	11110011000110	2
	231	00011111001111	4		231	11110011001100	2
	232	00011111001111	4		232	11110011100001	2
	233	00011100111111	4		233	11110011110000	2
5(A)	234	00001111111000	0	5(B)	234	11110000001111	0
	235	00001111111000	0		235	11110000001110	0
	236	000011111100110	0		236	11110000011001	0
	237	000011111100011	0		237	11110000011100	0
	238	000011110011110	0		238	11110000110001	0
	239	000011110001111	0		239	11110000111000	0
	240	000011100111110	0		240	11110001100001	0
	241	000011100011111	0		241	11110001110000	0
	242	000011001111110	0		242	11110011000001	0
	243	000011000111111	0		243	11110011100000	0
	244	00001111111001	2		244	11111000000111	2
	245	00001111111001	2		245	11111000001110	2
5(A)	246	00001111100111	2		246	11111000011001	2
	247	00001111001111	2		247	11111000011100	2
	248	00001110011111	2		248	11111000111000	2
	249	00001100111111	2		249	11111001110000	2
	250	00000111111100	0		250	11111000000011	0
	251	00000111111001	0		251	11111000000110	0
	252	00000111110011	0		252	11111000001100	0
5(A)	253	00000111100111	0		253	11111000011000	0
	254	00000111001111	0		254	11111000110000	0
	255	00000110011111	0		255	11111001100000	0
	255	00000110011111	0		255	11111001100000	0

Tableau 5 (CDS  $\leq 0$ )

	Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
5		0	01111110000001	0		0	10000001111110	0
		1	01111100110000	0		1	10000011001111	0
10		2	01111100011000	0		2	10000011100111	0
		3	01111100001100	0		3	10000011110011	0
		4	01111100000110	0		4	10000011111001	0
		5	01111100000011	0		5	10000011111100	0
		6	01111001110000	0		6	10000110001111	0
		7	01111001100001	0		7	10000110011110	0
15		8	01111000111000	0		8	10000111000111	0
		9	01111000110001	0		9	10000111001110	0
		10	01111000011100	0	10	10000111100011	0	0
		11	01111000011001	0	11	10000111100110	0	0
		12	01111000001110	0	12	10000111110001	0	0
		13	01111000000111	0	13	10000111111000	0	0
20		14	01110011110000	0	14	10001100001111	0	0
		15	01110011100001	0	15	10001100011110	0	0
		16	01110011001100	0	16	10001100110011	0	0
		17	01110011000110	0	17	10001100111001	0	0
		18	01110011000011	0	18	10001100111100	0	0
		19	01110001111000	0	19	10001110000111	0	0
25		20	01110001110001	0	20	10001110001110	0	0
		21	01110001100110	0	21	10001110011001	0	0
		22	01110001100011	0	22	10001110011100	0	0
		23	01110000111100	0	23	10001111000011	0	0
		24	01110000111001	0	24	10001111000110	0	0
		25	01110000110011	0	25	10001111001100	0	0
		26	01110000011110	0	26	10001111100001	0	0
30		27	01110000001111	0	27	10001111110000	0	0
		28	01100111110000	0	28	10011000001111	0	0
		29	01100111100001	0	29	10011000011110	0	0
		30	01100111001100	0	30	10011000110011	0	0
		31	01100111000110	0	31	10011000111001	0	0
		32	01100111000011	0	32	10011000111100	0	0
35	1(C)	33	01100110011100	0	33	10011001100011	0	0
		34	01100110011001	0	34	10011001100110	0	0
		35	01100110001110	0	35	10011001110001	0	0
		36	01100110000111	0	36	10011001111000	0	0
		37	01100011111000	0	37	10011100000111	0	0
		38	01100011110001	0	38	10011100001110	0	0
		39	01100011100110	0	39	10011100011001	0	0
40		40	01100011100011	0	40	10011100011100	0	0
		41	01100011001110	0	41	10011100110001	0	0
		42	01100011000111	0	42	10011100111000	0	0
		43	01100001111100	0	43	10011110000011	0	0
		44	01100001111001	0	44	10011110000110	0	0
		45	01100001110011	0	45	10011110001100	0	0
		46	01100001100111	0	46	10011110011000	0	0
45		47	01100000111110	0	47	10011111000001	0	0
		48	01100000011111	0	48	10011111100000	0	0
		49	01111100000001	-2	49	10000000110011	-4	-4
		50	01111001100000	-2	50	10000000111001	-4	-4
		51	01111000110000	-2	51	10000000111100	-4	-4
		52	01111000011000	-2	52	10000001100011	-4	-4
50		53	01111000001100	-2	53	10000001100110	-4	-4
		54	01111000000110	-2	54	10000001110001	-4	-4
		55	01111000000011	-2	55	10000001111000	-4	-4
		56	01110011100000	-2	56	10000011000011	-4	-4
		57	01110011000001	-2	57	10000011000110	-4	-4
		58	01110001110000	-2	58	10000011001100	-4	-4
		59	01110001100001	-2	59	10000011100001	-4	-4
55		60	01110000111000	-2	60	10000011110000	-4	-4
		61	01110000110001	-2	61	10000110000011	-4	-4
		62	01110000011100	-2	62	10000110000110	-4	-4
		63	01110000011001	-2	63	10000110001100	-4	-4

Tableau 5 (CDS  $\leq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
5							
10							
15							
20	1(C)						
25							
30							
35				1(D)			
40							
45	2(C)						
50							
55							
	64	01110000001110	-2		64	10000110011000	-4
	65	01110000000111	-2		65	10000111000001	-4
	66	01100111000000	-2		66	10000111000000	-4
	67	01100111000001	-2		67	10001100000011	-4
	68	01100110011000	-2		68	100011000000110	-4
	69	01100110001100	-2		69	10001100001100	-4
	70	01100110000110	-2		70	10001100011000	-4
	71	01100110000011	-2		71	10001100110000	-4
	72	01100011110000	-2		72	10001110000001	-4
	73	01100011100001	-2		73	10001111000000	-4
	74	01100011001100	-2		74	10011000000011	-4
	75	01100011000110	-2		75	10011000000110	-4
	76	01100011000011	-2		76	10011000001100	-4
	77	01100001111000	-2		77	10011000011000	-4
	78	01100001110001	-2		78	10011000110000	-4
	79	01100001100110	-2		79	10011001100000	-4
	80	01100001100011	-2		80	10011100000001	-4
	81	01100000111100	-2		81	10000000111110	-2
	82	01100000111001	-2		82	10000001100111	-2
	83	01100000110011	-2		83	10000001110011	-2
	84	01100000111110	-2		84	10000001111001	-2
	85	01100000001111	-2		85	10000001111100	-2
	86	01110000110000	-4		86	10000011000111	-2
	87	01110000011000	-4		87	10000011001110	-2
	88	01110000001100	-4		88	10000011100011	-2
	89	01100110000001	-4		89	10000011100110	-2
	90	01100011000001	-4		90	10000011110001	-2
	91	01100001110000	-4		91	10000011111000	-2
	92	01100001100001	-4		92	10000110000111	-2
	93	01100000111000	-4		93	10000110001110	-2
	94	01100000110001	-4		94	10000110011001	-2
	95	01100000011100	-4		95	10000110011100	-2
	96	01100000011001	-4		96	10000111000011	-2
	97	00111000011000	-4		97	10000111000110	-2
	98	00111000001100	-4		98	10000111001100	-2
	99	00111111000000	-2		99	10000111100001	-2
	100	00111110000001	-2		100	10000111110000	-2
	101	00111110011000	-2		101	10001100000111	-2
	102	00111110001100	-2		102	10001100001110	-2
	103	00111110000110	-2		103	10001100011001	-2
	104	00111110000011	-2		104	10001100011100	-2
	105	00111110000001	-2		105	10001100110001	-2
	106	00111001110000	-2		106	10001100111000	-2
	107	00111001100001	-2		107	10001110000011	-2
	108	00111000111000	-2		108	10001110000110	-2
	109	00111000110001	-2		109	10001110001100	-2
	110	00111000011100	-2		110	10001110011000	-2
	111	00111000011001	-2		111	10001111000001	-2
	112	00111000001110	-2		112	10001111100000	-2
	113	00111000000111	-2		113	10011000000111	-2
	114	00110011110000	-2		114	10011000001110	-2
	115	00110011100001	-2		115	10011000011001	-2
	116	00110011001100	-2		116	10011000011100	-2
	117	00110011000110	-2		117	10011000110001	-2
	118	00110011000011	-2		118	10011000111000	-2
	119	00110001111000	-2		119	10011001100001	-2
	120	00110001110001	-2		120	10011001110000	-2
	121	00110001100110	-2		121	10011100000011	-2
	122	00110001100011	-2		122	10011100000110	-2
	123	00110000111100	-2		123	10011100001100	-2
	124	00110000111001	-2		124	10011100011000	-2
	125	00110000110011	-2		125	10011100110000	-2
	126	00110000011110	-2		126	10011110000001	-2
	127	00110000001111	-2		127	10011111000000	-2

Tableau 5 (CDS  $\leq 0$ )

Classe	Données à 8 bits	Codes de modula- tion commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modula- tion commençant par "1"	CDS
5							
10							
15							
20							
25							
30							
35							
40							
45							
50							
55							
	2(C)			2(D)			
	128	0011111100000	0	128	11000000011111	0	
	129	00111111000001	0	129	11000000111110	0	
	130	001111110011000	0	130	11000001100111	0	
	131	001111110001100	0	131	11000001110011	0	
	132	001111110000110	0	132	11000001111001	0	
	133	001111110000011	0	133	11000001111100	0	
	134	001111100111000	0	134	11000011000111	0	
	135	001111100110001	0	135	11000011001110	0	
	136	001111100011100	0	136	11000011100011	0	
	137	001111100011001	0	137	11000011100110	0	
	138	001111100001110	0	138	11000011110001	0	
	139	001111100000111	0	139	11000011111000	0	
	140	001111001111000	0	140	11000110000111	0	
	141	001111001110001	0	141	11000110001110	0	
	142	001111001100110	0	142	11000110011001	0	
	143	001111001100011	0	143	11000110011100	0	
	144	001111000111100	0	144	11000111000011	0	
	145	001111000111001	0	145	11000111000110	0	
	146	001111000110011	0	146	11000111001100	0	
	147	001111000011110	0	147	11000111100001	0	
	148	001111000001111	0	148	11000111110000	0	
	149	00110011111000	0	149	11001100000111	0	
	150	00110011110001	0	150	11001100001110	0	
	151	00110011100110	0	151	11001100011001	0	
	152	00110011100011	0	152	11001100011100	0	
	153	00110011001110	0	153	11001100110001	0	
	154	00110011000111	0	154	11001100111000	0	
	155	00110001111100	0	155	11001110000011	0	
	156	00110001111001	0	156	11001110000110	0	
	157	00110001110011	0	157	11001110001100	0	
	158	00110001100111	0	158	11001110011000	0	
	159	00110000111110	0	159	11001111000001	0	
	160	00110000011111	0	160	11001111100000	0	
	161	00110011000001	-4	161	11000000011110	-2	
	162	00110001100001	-4	162	11000000110011	-2	
	163	00110000111000	-4	163	11000000111001	-2	
	164	00110000110001	-4	164	11000000111100	-2	
	165	00110000011100	-4	165	11000001100011	-2	
	166	00110000011001	-4	166	11000001100110	-2	
	167	000111110000001	-4	167	11000001110001	-2	
	168	000111100011000	-4	168	11000001111000	-2	
	169	000111100001100	-4	169	11000011000011	-2	
	170	000111100000011	-4	170	11000011000110	-2	
	171	00011001100001	-4	171	11000011001100	-2	
	172	00011000111000	-4	172	11000011100001	-2	
	173	00011000110001	-4	173	11000011110000	-2	
	174	00011000011100	-4	174	11000110000011	-2	
	175	00011000011001	-4	175	11000110000110	-2	
	176	00011000000111	-4	176	11000110001100	-2	
	177	00011111100000	-2	177	11000110011000	-2	
	178	00011111000001	-2	178	11000111000001	-2	
	179	00011110011000	-2	179	11000111100000	-2	
	180	00011110001100	-2	180	11001100000011	-2	
	181	00011110000110	-2	181	11001100000110	-2	
	182	00011110000011	-2	182	11001100001100	-2	
	183	00011100111000	-2	183	11001100011000	-2	
	184	00011100110001	-2	184	11001100110000	-2	
	185	00011100011100	-2	185	11001110000001	-2	
	186	00011100011001	-2	186	11001111000000	-2	
	187	00011100001110	-2	187	11000000011001	-4	
	188	00011100000111	-2	188	11000000011100	-4	
	189	00011001111000	-2	189	11000000110001	-4	
	190	00011001110001	-2	190	11000000111000	-4	
	191	00011001100110	-2	191	11000001100001	-4	

Tableau 5 (CDS  $\leq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
3(C)	192	00011001100011	-2	2(D)	192	11000001110000	-4
	193	00011000111100	-2		193	11000011000001	-4
	194	00011000111001	-2		194	11000011100000	-4
	195	00011000110011	-2		195	11000110000001	-4
	196	00011000011110	-2		196	11000111000000	-4
	197	00011000001111	-2		197	11001100000001	-4
	198	00011111110000	0		198	11100000001111	0
	199	00011111100001	0		199	11100000011110	0
	200	00011111001100	0		200	11100000110011	0
	201	00011111000110	0		201	11100000111001	0
	202	00011111000011	0		202	11100000111100	0
	203	00011110011100	0		203	11100001100011	0
	204	00011110011001	0		204	11100001100110	0
	205	00011110001110	0		205	11100001110001	0
	206	00011110000111	0		206	11100001111000	0
	207	00011100111100	0		207	11100011000011	0
4(C)	208	00011100111001	0	3(D)	208	11100011000110	0
	209	00011100110011	0		209	11100011001100	0
	210	00011100011110	0		210	11100011100001	0
	211	00011100001111	0		211	11100011110000	0
	212	00011001111100	0		212	11100110000011	0
	213	00011001111001	0		213	11100110000110	0
	214	00011001110011	0		214	11100110001100	0
	215	00011001100111	0		215	11100110011000	0
	216	00011000111110	0		216	11100111000001	0
	217	00011000011111	0		217	11100111100000	0
	218	00001110000011	-4		218	11100000001110	-2
	219	00001100000011	-4		219	11100000011001	-2
	220	00001111110000	-2		220	11100000011100	-2
	221	00001111100001	-2		221	11100000110001	-2
	222	00001111001100	-2		222	11100000111000	-2
	223	00001111000110	-2		223	11100001100001	-2
	224	00001111000011	-2		224	11100001110000	-2
5(C)	225	00001110011100	-2	4(D)	225	11100011000001	-2
	226	00001110011001	-2		226	11100011100000	-2
	227	00001110001110	-2		227	11100110000001	-2
	228	00001110000111	-2		228	11100111000000	-2
	229	00001100111100	-2		229	11100000001100	-4
	230	00001100111001	-2		230	11100000011000	-4
	231	00001100110011	-2		231	11100000110000	-4
	232	00001100011110	-2		232	11100001100000	-4
	233	00001100001111	-2		233	11100011000000	-4
	234	00001111111000	0		234	11110000000111	0
	235	00001111110001	0		235	11110000001110	0
	236	00001111100110	0		236	11110000011001	0
	237	00001111100011	0		237	11110000011100	0
	238	00001111001110	0		238	11110000110001	0
	239	00001111000111	0		239	11110000111000	0
	240	00001110011110	0		240	11110001100001	0
	241	00001110001111	0		241	11110001110000	0
5(D)	242	00001100111110	0	5(D)	242	11110011000001	0
	243	00001100011111	0		243	11110011100000	0
	244	00001111111000	-2		244	11110000000110	-2
	245	00001111110001	-2		245	11110000001100	-2
	246	00001111100110	-2		246	11110000011000	-2
	247	00001111000011	-2		247	11110000110000	-2
	248	00001110001111	-2		248	11110001100000	-2
	249	00001100011111	-2		249	11110011000000	-2
	250	00001111111100	0		250	11111000000011	0
	251	00001111111001	0		251	11111000000110	0
	252	00001111100110	0		252	11111000001100	0
	253	00001111001111	0		253	11111000011000	0
	254	00001110011111	0		254	11111000110000	0
	255	00001100111111	0		255	11111001100000	0

TABLEAU 12

Données à 8 bits	Codes de modulation	CDS
248	11111000110001	2
249	11111000111000	2
250	11111001100001	2
251	11111001110000	2

TABLEAU 13

Données à 8 bits	Codes de modulation	CDS
248	00000111001110	-2
249	00000111000111	-2
250	00000110011110	-2
251	00000110001111	-2

5. Un procédé de modulation numérique pour convertir des données numériques à 8 bits en codes de modulation numériques à 14 bits, ce procédé de modulation numérique comprenant :

une étape 1 pour sélectionner jusqu'à quatre codes de modulation numériques à 14 bits pour chaque donnée numérique à 8 bits, le code de modulation numérique à 14 bits étant sélectionné par les procédures suivantes :

(a) on sélectionne parmi les  $2^{14}$  codes numériques à 14 bits un code numérique dans lequel les nombres de bits identiques consécutifs sont égaux à 6 ou moins dans les 7 premiers bits, à 2 à 7 du second bit au 13-ième bit, et à 5 ou moins dans les 6 derniers bits, et on répète cette procédure de sélection,

(b) on sélectionne parmi les codes numériques à 14 bits sélectionnés à la procédure (a) un code numérique dont le premier bit est "0", et dont la CDS a une valeur absolue inférieure ou égale à 6, et on répète cette procédure de sélection,

(c) on sélectionne parmi les codes numériques à 14 bits sélectionnés à la procédure (a) un code numérique dont le premier bit est "1", et dont la CDS a une valeur absolue inférieure ou égale à 4, et on répète cette procédure de sélection,

(d) on sélectionne parmi les codes numériques à 14 bits sélectionnés à la procédure (b) un code numérique dont la valeur de CDS est égale à 0, et on combine le code numérique à 14 bits sélectionné avec son code inversé, pour former un groupe avec les 2 codes numériques, et on répète cette procédure de sélection,

(e) on sélectionne parmi les codes numériques à 14 bits sélectionnés à la procédure (b) un code numérique dont la valeur de CDS est égale à +2, +4 ou +6, on sélectionne parmi les codes numériques à 14 bits sélectionnés à la procédure (c) un code numérique dont la valeur de CDS est égale à +2 ou

+4, et on combine les deux codes numériques à 14 bits sélectionnés avec leurs codes inversés, pour former un groupe avec les 4 codes numériques, et on répète cette procédure de sélection, et  
(f) on sélectionne pour les codes de modulation numériques à 14 bits 256 groupes parmi les groupes formés dans les procédures ci-dessus;

5 une étape 2 pour sélectionner un groupe de codes de modulation numériques à 14 bits parmi les 256 groupes de codes de modulation numériques à 14 bits, le groupe sélectionné correspondant à la donnée numérique à 8 bits qui est appliquée en entrée;

une étape 3 pour sélectionner en outre un ou plusieurs codes de modulation numériques à 14 bits dans le groupe sélectionné à l'étape 2, chacun des codes de modulation numériques à 14 bits satisfaisant  
10 l'exigence selon laquelle le nombre de bits identiques consécutifs dans la partie de jonction entre le code de modulation numérique à 14 bits précédent déjà sélectionné, et le code de modulation numérique à 14 bits à sélectionner, doit avoir l'une des valeurs 2 à 7; et

une étape 4 pour sélectionner en outre un code de modulation numérique à 14 bits parmi les codes de modulation sélectionnés à l'étape 3, de façon que ce code de modulation à 14 bits particulier satisfasse  
15 l'exigence selon laquelle la valeur absolue de la DSV de bit pour chaque bit dans le code de modulation doit être inférieure ou égale à 8.

6. Un procédé de modulation numérique selon la revendication 5, dans lequel l'étape 3 comprend les procédures suivantes :

20 on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "01", "001", "0001", "00001", "000001" et "0000001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "10".

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "10", "110", "1110", "11110", "111110" et "1111110" lorsque le code de modulation numérique précédent  
25 qui a déjà été sélectionné se termine par "01";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110", "1111110", "01", "001", "0001", "00001" et "000001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "100";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001", "0000001", "10", "110", "1110", "11110" et "111110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "011";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110", "1111110", "01", "001", "0001" et "00001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "1000";

35 on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001", "0000001", "10", "110", "1110" et "11110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "0111"; on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110", "1111110", "01", "001" et "0001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "10000";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001", "0000001", "10", "110" et "1110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "01111";

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "110", "1110", "11110", "111110", "1111110", "01" et "001" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "100000"; et

on sélectionne l'un quelconque des codes de modulation numériques dont les premiers bits sont "001", "0001", "00001", "000001", "0000001", "10" et "110" lorsque le code de modulation numérique précédent qui a déjà été sélectionné se termine par "011111".

50 7. Un procédé de modulation numérique selon la revendication 5, dans lequel l'étape 4 comprend les procédures suivantes :

on sélectionne l'un quelconque des codes de modulation numériques dont les CDS sont égales à 0, -2, -4 et -6 lorsque la DSV à la fin du code de modulation numérique à 14 bits précédent qui a déjà été sélectionné est égale à +4 ou +2;

55 on sélectionne l'un quelconque des codes de modulation numériques dont les CDS sont égales à +4, +2, 0, -2 et -4 lorsque la DSV à la fin du code de modulation numérique à 14 bits précédent qui a déjà été sélectionné est égale à 0; et

on sélectionne l'un quelconque des codes de modulation numériques dont les CDS sont égales à +6, +4, +2 et 0 lorsque la DSV à la fin du code de modulation numérique à 14 bits précédent qui a déjà été sélectionné est égale à -2 ou -4.

- 5 8. Un procédé de modulation numérique selon la revendication 5, dans lequel les codes de modulation numériques sont les codes qui sont indiqués dans les Tableaux 17 et 18 suivants.

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Tableau 17 (CDS  $\geq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
5							
10	0	0111110000001	0		0	1000000111110	0
	1	01111100110000	0		1	100000011001111	0
	2	01111100011000	0		2	100000011100111	0
	3	011111000001100	0		3	100000011110011	0
	4	011111000000110	0		4	100000011111001	0
	5	011111000000011	0		5	100000011111100	0
	6	011111001110000	0		6	100001100011111	0
	7	011111001100001	0		7	100001100111110	0
15	8	011111000111000	0		8	100001110001111	0
	9	011111000110001	0		9	100001110011110	0
	10	011111000011100	0		10	100001111000111	0
	11	011111000011001	0		11	100001111000110	0
	12	011111000001110	0		12	100001111100011	0
	13	011111000000111	0		13	100001111110000	0
	14	011100111100000	0		14	100011000001111	0
20	15	01110011100001	0		15	100011000111110	0
	16	011100110011100	0		16	100011001100111	0
	17	011100110001110	0		17	100011001110011	0
	18	011100110000111	0		18	100011001111000	0
	19	011100011110000	0		19	100011100001111	0
	20	01110001110001	0		20	100011100011110	0
	21	011100011001110	0		21	100011100110011	0
25	22	011100011000111	0		22	100011100111000	0
	23	011100001111100	0		23	100011110000111	0
	24	01110000111001	0		24	100011110001110	0
	25	01110000110011	0	1 (B)	25	100011110011000	0
	26	01110000011110	0		26	10001111100001	0
	27	01110000001111	0		27	10001111110000	0
	28	01100111110000	0		28	100110000001111	0
	29	01100111100001	0		29	10011000011110	0
30	30	011001110011100	0		30	100110001100111	0
	31	011001110001110	0		31	100110001110011	0
	32	011001110000111	0		32	100110001111000	0
	33	011001100111100	0		33	100110011000111	0
	34	01100110011001	0		34	100110011001110	0
	35	011001100011110	0		35	10011001110001	0
	36	011001100001111	0		36	10011001111000	0
35	37	01100011111000	0		37	100111000001111	0
	38	01100011110001	0		38	100111000011110	0
	39	011000111001110	0		39	100111000110011	0
	40	011000111000111	0		40	100111000111000	0
	41	011000110011110	0		41	100111001100011	0
	42	011000110001111	0		42	100111001110000	0
	43	01100001111100	0		43	100111100000111	0
40	44	0110000111001	0		44	100111100001110	0
	45	01100001110011	0		45	100111100011000	0
	46	01100001100111	0		46	100111100110000	0
	47	01100000111110	0		47	100111110000011	0
	48	01100000011111	0		48	100111111000000	0
	49	01111111000001	2		49	100000111111110	2
	50	011111110011000	2		50	100001100111111	2
	51	011111110001100	2		51	100001110011111	2
45	52	011111110000110	2		52	100001111100111	2
	53	011111110000011	2		53	100001111100110	2
	54	011111100111000	2		54	100001111110011	2
	55	011111100110001	2		55	100001111111000	2
	56	011111100011100	2		56	100011000111111	2
	57	011111100011001	2		57	100011001111110	2
	58	011111100001110	2		58	100011100011111	2
50	59	011111000001111	2		59	100011100111110	2
	60	011111001111000	2		60	100011110001111	2
	61	01111100110001	2		61	100011110011110	2
	62	011111001100110	2		62	100011111000111	2
	63	011111001100011	2		63	100011111100110	2
	64	011111000111100	2		64	100011111100011	2
	65	011111000111001	2		65	100011111110000	2
55	66	011111000110011	2		66	100110000111111	2

Tableau 17 (CDS  $\geq 0$ )

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Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
1 (A)	67	01111000011110	2	1 (B)	67	10011000111110	2
	68	01111000001111	2		68	10011001100111	2
	69	01110011111000	2		69	10011001110011	2
	70	01110011110001	2		70	10011001111001	2
	71	01110011100110	2		71	10011001111100	2
	72	01110011100011	2		72	10011100001111	2
	73	01110011001110	2		73	10011100011110	2
	74	01110011000111	2		74	10011100110011	2
	75	01110001111100	2		75	10011100111001	2
	76	01110001111001	2		76	10011100111100	2
	77	01110001110011	2		77	10011110000111	2
	78	01110001100111	2		78	10011110001110	2
	79	01110000111110	2		79	10011110011001	2
	80	01110000111111	2		80	10011110011100	2
	81	01100111111000	2		81	10011111000011	2
	82	01100111110001	2		82	10011111000110	2
	83	01100111100110	2		83	10011111001100	2
	84	01100111100011	2		84	10011111100001	2
	85	01100111001110	2		85	10011111110000	2
	86	01100111000111	2		86	10011111100011	4
	87	01100110011110	2	2 (B)	87	11000011111110	4
	88	01100110001111	2		88	11000110011111	4
	89	01100011111100	2		89	11000111001111	4
	90	01100011111001	2		90	11000111100111	4
	91	01100011110011	2		91	11000111110011	4
	92	01100011100111	2		92	11000111111001	4
	93	01100011001111	2		93	11000111111100	4
	94	01100001111110	2		94	11001100011111	4
	95	01111111001100	4		95	11001100111110	4
	96	01111111000110	4		96	11001110001111	4
	97	01111111000011	4		97	11001110011110	4
	98	01111110011100	4		98	11001111000111	4
	99	01111110011001	4		99	11001111001110	4
	100	01111110001110	4		100	11001111100011	4
	101	01111110000111	4		101	11000001111110	2
	102	01111110011100	4		102	11000011001111	2
	103	01111110011001	4		103	11000011100111	2
	104	01111110011001	4		104	11000011110011	2
	105	01111110001110	4		105	11000011111001	2
	106	01111110000111	4		106	11000011111100	2
	107	01111001111100	4		107	11000110001111	2
	108	01111001111001	4		108	11000110011110	2
	109	01111001110011	4		109	11000111000111	2
	110	01111001100111	4		110	11000111001110	2
	111	01111000111110	4		111	11000111100011	2
	112	01111000011111	4		112	11000111100110	2
	113	01110011111100	4		113	11000111110001	2
	114	01110011111001	4		114	11000111111000	2
	115	01110011110011	4		115	11001100001111	2
	116	01110011100111	4		116	11001100011110	2
	117	01110011001111	4		117	11001100110011	2
	118	01110001111110	4		118	11001100111001	2
	119	01100111111100	4		119	11001100111100	2
	120	01100111111001	4		120	11001110000111	2
	121	01100111110011	4		121	11001110001110	2
	122	01100111100111	4		122	11001110011001	2
	123	01100111001111	4		123	11001110011100	2
	124	01100110011111	4		124	11001111000011	2
	125	01100011111110	4		125	11001111000110	2
	126	01111111000011	6		126	11001111001100	2
	127	01111110001111	6		127		11001111100001	2
	128	01111110001111	6		128		11001111110000	2
2 (A)	129	00111111100000	0		129	11000000001111	0
	130	00111111000001	0		130	11000000111110	0
	131	00111111001100	0		131	11000001100111	0
	132	00111111000110	0		132	11000001110011	0
	133	00111111000011	0		133	11000001111001	0

Tableau 17 (CDS  $\geq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
2 (A)	134	00111110000011	0	2 (B)	134	11000001111100	0
	135	00111100111000	0		135	11000011000111	0
	136	00111100110001	0		136	11000011001110	0
	137	00111100011100	0		137	11000011100011	0
	138	00111100011001	0		138	11000011100110	0
	139	00111100001110	0		139	11000011110001	0
	140	00111100000111	0		140	11000011110000	0
	141	00111001111000	0		141	11000100000111	0
	142	00111001110001	0		142	11000100011110	0
	143	00111001100110	0		143	11000100110011	0
	144	00111001100011	0		144	11000100111000	0
	145	00111000111100	0		145	11000110000111	0
	146	00111000111001	0		146	11000110001110	0
	147	00111000110011	0		147	11000110011000	0
	148	00111000011110	0		148	11000111000001	0
2 (A)	149	00111000001111	0	2 (B)	149	11000111110000	0
	150	00110011111000	0		150	11001100000111	0
	151	00110011110001	0		151	11001100001110	0
	152	00110011100110	0		152	11001100011001	0
	153	00110011100011	0		153	11001100011100	0
	154	00110011001110	0		154	11001100110001	0
	155	00110011000111	0		155	11001100111000	0
	156	00110001111100	0		156	11001100000111	0
	157	00110001111001	0		157	11001100001110	0
	158	00110001110011	0		158	11001100011000	0
	159	00110001100111	0		159	11001100111000	0
	160	00110000111110	0		160	11001110000001	0
	161	00110000011111	0		161	11001111000000	0
	162	00111111100001	2		162	11001111100110	4
	163	00111111001100	2		163	11001111100001	4
2 (A)	164	00111111000110	2	2 (B)	164	11001111110000	4
	165	00111111000011	2		165	11100001111110	4
	166	00111111001110	2		166	11100011001111	4
	167	00111111001101	2		167	11100011100111	4
	168	00111111000110	2		168	11100011110011	4
	169	00111111000011	2		169	11100011111001	4
	170	00111100111100	2		170	11100011111100	4
	171	00111100111001	2		171	11100110001111	4
	172	00111100110011	2		172	11100110011110	4
	173	00111100011110	2		173	11100111000111	4
	174	00111100001111	2		174	11100111001110	4
	175	00111001111100	2		175	11100111100011	4
	176	00111001111001	2		176	11100111100110	4
	177	00111001100111	2		177	11100111110001	4
	178	00111001100110	2		178	11100111111000	4
2 (A)	179	00111000111110	2	3 (B)	179	11100000011111	2
	180	00111000011111	2		180	11100000111110	2
	181	00110011111100	2		181	11100001100111	2
	182	00110011111001	2		182	11100001110011	2
	183	00110011110011	2		183	11100001111001	2
	184	00110011100111	2		184	11100001111100	2
	185	00110011001111	2		185	11100011000111	2
	186	00110001111110	2		186	11100011001110	2
	187	00111111100110	4		187	11100011100011	2
	188	00111111100011	4		188	11100011100110	2
	189	00111111001110	4		189	11100011110001	2
	190	00111111000111	4		190	11100011111000	2
	191	00111110011110	4		191	11100110000111	2
	192	00111110001111	4		192	11100110001110	2
	193	00111100111110	4		193	11100110011001	2
	194	00111100011111	4		194	11100110011100	2
2 (A)	195	00111001111110	4		195	11100111000011	2
	196	00111001111110	4		196	11100111000110	2
	197	00111111100111	6		197	11100111001100	2
	198	00111111001111	6		198	11100111100001	2
	199	00111110011111	6		199	11100111110000	2

Tableau 17 (CDS  $\geq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
3 (A)	200	00011111110000	0	3 (B)	200	11100000001111	0
	201	00011111110001	0		201	11100000001110	0
	202	00011111110010	0		202	11100000001001	0
	203	00011111110011	0		203	11100000001100	0
	204	00011111110001	0		204	11100000001100	0
	205	00011111110011	0		205	11100000001001	0
	206	00011111110011	0		206	11100000001010	0
	207	00011111110011	0		207	11100000001001	0
	208	00011111110001	0		208	11100000001100	0
	209	00011111110011	0		209	11100000001001	0
	210	00011111110011	0		210	11100000001010	0
	211	00011111110011	0		211	11100000001001	0
	212	00011111110011	0		212	11100000001001	0
	213	00011111110011	0		213	11100000001000	0
	214	00011111110011	0		214	11100000001001	0
4 (A)	215	00011001111001	0	4 (B)	215	11100000001010	0
	216	00011001111001	0		216	11100000001001	0
	217	00011001111001	0		217	11100000001001	0
	218	00011001111110	0		218	11100000001001	0
	219	00011000011111	0		219	11100000001000	0
	220	00011111110001	2		220	11110000001111	2
	221	00011111110010	2		221	11110000001110	2
	222	00011111110011	2		222	11110000001001	2
	223	00011111110011	2		223	11110000001100	2
	224	00011111110011	2		224	11110000001100	2
	225	00011111110011	2		225	11110000001001	2
	226	00011111110011	2		226	11110000001010	2
	227	00011111110011	2		227	11110000001001	2
	228	00011111110011	2		228	11110000001100	2
	229	00011111110011	2		229	11110000001001	2
5 (A)	230	00011111110011	4	5 (B)	230	11110000001001	2
	231	00011111110011	4		231	11110000001001	2
	232	00011111110011	4		232	11110000001001	2
	233	00011111110011	4		233	11110000001000	2
	234	00001111111000	0		234	11110000000011	0
	235	00001111111001	0		235	11110000000110	0
	236	00001111111001	0		236	11110000001001	0
	237	00001111111001	0		237	11110000001100	0
	238	00001111111001	0		238	11110000001001	0
	239	00001111111001	0		239	11110000001000	0
	240	00001111111001	0		240	11110000001001	0
	241	00001111111001	0		241	11110000001000	0
	242	00001111111001	0		242	11110000000001	0
	243	00001111111001	0		243	11110000000000	0
	244	00001111111001	2		244	11111000000011	2
	245	00001111111001	2		245	11111000001100	2
6 (A)	246	00001111111001	2	6 (B)	246	11111000001001	2
	247	00001111111001	2		247	11111000001100	2
	248	00001111111001	2		248	11111000001000	2
	249	00000111111100	0		249	11111000000011	0
	250	00000111111100	0		250	11111000000010	0
	251	00000111111100	0		251	11111000000100	0
	252	00000111111100	0		252	11111000001000	0
	253	00000111111100	0		253	11111000001000	0
7 (A)	254	00000111111100	0	7 (B)	254	11111000000000	0
	255	00000011111110	0		255	11111000000001	0

Tableau 18 (CDS  $\leq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
	0	01111110000001	0		0	10000001111110	0
	1	01111100110000	0		1	10000011001111	0
10	2	01111100011000	0		2	10000011100111	0
	3	01111100001100	0		3	10000011110011	0
	4	01111100000110	0		4	10000011111001	0
	5	01111100000011	0		5	10000011111100	0
	6	01111001110000	0		6	10000110001111	0
	7	01111001100001	0		7	10000110011110	0
	8	01111001110000	0		8	10000110001111	0
15	9	01111001100001	0		9	10000110011110	0
	10	01111000011100	0		10	10000111000111	0
	11	01111000011001	0		11	10000111001110	0
	12	01111000001110	0		12	10000111110001	0
	13	01111000000111	0		13	10000111111000	0
	14	01110011110000	0		14	10001100001111	0
	15	01110011100001	0		15	10001100011110	0
20	16	01110011001100	0		16	10001100110011	0
	17	01110011000110	0		17	10001100111001	0
	18	01110011000011	0		18	10001100111100	0
	19	01110001111000	0		19	10001110000111	0
	20	01110001100001	0		20	10001110001110	0
	21	01110001100110	0		21	10001110011001	0
	22	01110001100011	0		22	10001110011100	0
25	23	01110000111100	0		23	10001110000111	0
	24	01110000111001	0		24	10001110001110	0
	25	01110000110011	0		25	10001110011001	0
	26	01110000011110	0		26	10001111000011	0
	27	01110000001111	0		27	10001111100001	0
	28	01100111110000	0		28	10011000000111	0
	29	01100111100001	0		29	10011000011110	0
	30	01100111001100	0		30	10011000110011	0
30	31	01100111000110	0		31	10011000111001	0
	32	01100111000011	0		32	10011000111100	0
	33	01100110011100	0		33	10011001100011	0
	34	01100110011001	0		34	10011001100110	0
	35	01100110001110	0		35	10011001110001	0
	36	01100110000111	0		36	10011001111000	0
	37	01100011111000	0		37	10011100000111	0
	38	01100011110001	0		38	10011100001110	0
35	39	01100011100110	0		39	10011100011001	0
	40	01100011100011	0		40	10011100011100	0
	41	01100011001110	0		41	10011100110001	0
	42	01100011000111	0		42	10011100111000	0
	43	01100011111000	0		43	10011110000011	0
	44	01100011110001	0		44	10011110000110	0
	45	01100011100110	0		45	10011110001100	0
40	46	01100011001111	0		46	10011110011000	0
	47	01100000111110	0		47	10011111000001	0
	48	01100000011111	0		48	10011111100000	0
	49	01111100000001	-2		49	10000000111110	-2
	50	01111001100000	-2		50	10000001100111	-2
	51	01111000110000	-2		51	10000001110011	-2
	52	01111000011000	-2		52	10000001111001	-2
45	53	01111000001100	-2		53	10000001111100	-2
	54	01111000000110	-2		54	10000011000111	-2
	55	01111000000011	-2		55	10000011001110	-2
	56	01110011100000	-2		56	10000011100011	-2
	57	01110011000001	-2		57	10000011100110	-2
	58	01110001110000	-2		58	10000011110001	-2
	59	01110001100001	-2		59	10000011111000	-2
50	60	01110000111000	-2		60	10000110000111	-2
	61	01110000110001	-2		61	10000110001110	-2
	62	01110000011100	-2		62	10000110011001	-2
	63	01110000011001	-2		63	10000110011100	-2
	64	01110000001110	-2		64	10000111000011	-2
	65	01110000000111	-2		65	10000111000110	-2
	66	01100111110000	-2		66	10000111001100	-2

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Tableau 18 (CDS  $\leq 0$ )

Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
1 (c)	67	01100111000001	-2	1 (d)	67	10000111100001	-2
	68	01100110011000	-2		68	10000111110000	-2
	69	01100110001100	-2		69	10001100000111	-2
	70	01100110000110	-2		70	10001100001110	-2
	71	01100110000011	-2		71	10001100011001	-2
	72	01100011110000	-2		72	10001100011100	-2
	73	01100011100001	-2		73	10001100110001	-2
	74	01100011001100	-2		74	10001100111000	-2
	75	01100011000110	-2		75	10001110000011	-2
	76	01100011000011	-2		76	10001110000110	-2
	77	01100001111000	-2		77	10001110001100	-2
	78	01100001110001	-2		78	10001110011000	-2
	79	01100001100110	-2		79	10001111000001	-2
	80	01100001100011	-2		80	10001111100000	-2
	81	01100000111100	-2		81	10011000000111	-2
2 (c)	82	01100000111001	-2		82	10011000001110	-2
	83	01100000110011	-2		83	10011000011001	-2
	84	01100000011110	-2		84	10011000011100	-2
	85	01100000001111	-2		85	10011000110001	-2
	86	011000000111000	-4		86	10011000111000	-2
	87	00111100000001	-4		87	10011001100001	-2
	88	00111100110000	-4		88	10011001110000	-2
	89	00111100011000	-4		89	10011100000011	-2
	90	00111100001100	-4		90	10011100000110	-2
	91	00111100000110	-4		91	10011100001100	-2
	92	00111100000011	-4		92	10011100011000	-2
	93	00111100000001	-4		93	10011100110000	-2
	94	00110011100000	-4		94	10011110000001	-2
	95	00110011000001	-4		95	10000000110011	-4
	96	00110001110000	-4		96	10000000111001	-4
	97	00110001100001	-4		97	10000000111100	-4
	98	00110000111000	-4		98	10000001100011	-4
	99	00110000110001	-4		99	10000001100110	-4
	100	00110000011100	-4		100	10000001110001	-4
	101	00111110000001	-2		101	10000001111000	-4
	102	00111110011000	-2		102	10000011000011	-4
	103	00111110001100	-2		103	10000011000110	-4
	104	00111110000110	-2		104	10000011001100	-4
	105	00111110000011	-2		105	10000011100001	-4
	106	00111110000001	-2		106	10000011110000	-4
	107	00111100111000	-2		107	10000110000011	-4
	108	00111100110001	-2		108	10000110000110	-4
	109	00111100011100	-2		109	10000110001100	-4
	110	00111100011001	-2		110	10000110011000	-4
	111	00111100001110	-2		111	10000111000001	-4
	112	001111000011001	-2		112	10000111100000	-4
	113	00111100000111	-2		113	10001100000011	-4
	114	00111100000011	-2		114	10001100000110	-4
	115	00110011110000	-2		115	10001100001100	-4
	116	00110011100001	-2		116	10001100011000	-4
	117	00110011001100	-2		117	10001100110000	-4
	118	00110011000110	-2		118	10001110000001	-4
	119	00110011000011	-2		119	10011000000011	-4
	120	00110001111000	-2		120	10011000000110	-4
	121	00110001110001	-2		121	10011000001100	-4
	122	00110001100110	-2		122	10011000011000	-4
	123	00110001100011	-2		123	10011000110000	-4
	124	00110000111100	-2		124	10011001100000	-4
	125	00110000111001	-2		125	10011100000001	-4
	126	00110000110011	-2		126	10000000111000	-6
	127	00110000011110	-2		127	10000001110000	-6
	128	00110000001111	-2		128	10000011100000	-6
2 (d)	129	00111111100000	0	2 (d)	129	11000000011111	0
	130	00111111000001	0		130	11000000011110	0
	131	00111111001100	0		131	11000001100111	0
	132	00111110001100	0		132	11000001110011	0

Tableau 18 (CDS  $\leq 0$ )

Classe	Données à 8 bits	Codes de modula- tion commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modula- tion commençant par "1"	CDS
2 (C)	133	00111110000110	0	2 (D)	133	11000001111001	0
	134	00111110000011	0		134	11000001111100	0
	135	001111100111000	0		135	11000011000111	0
	136	001111100110001	0		136	11000011001110	0
	137	001111100011100	0		137	11000011100011	0
	138	001111100011001	0		138	11000011100110	0
	139	001111100001110	0		139	11000011110001	0
	140	001111100000111	0		140	11000011111000	0
	141	001110011111000	0		141	11000110000111	0
	142	00111001110001	0		142	11000110001110	0
	143	00111001100110	0		143	11000110011001	0
	144	00111001100011	0		144	11000110011100	0
	145	00111000111100	0		145	11000111000011	0
	146	00111000111001	0		146	11000111000110	0
	147	00111000110011	0		147	11000111001100	0
3 (C)	148	00111000011110	0		148	11000111100001	0
	149	00111000001111	0		149	11000111110000	0
	150	001100111111000	0		150	11001100000111	0
	151	00110011110001	0		151	11001100001110	0
	152	00110011100110	0		152	11001100011001	0
	153	00110011100011	0		153	11001100011100	0
	154	00110011001110	0		154	11001100110001	0
	155	00110011000111	0		155	11001100111000	0
	156	00110001111100	0		156	11001110000011	0
	157	00110001111001	0		157	11001110000110	0
	158	00110001110011	0		158	11001110001100	0
	159	00110001100111	0		159	11001110011000	0
	160	00110000111110	0		160	11001111000001	0
	161	00110000011111	0		161	11001111100000	0
	162	00110000011001	-4		162	11000000011110	-2
	163	00110000001110	-4		163	11000000110011	-2
	164	00110000000111	-4		164	11000000111001	-2
3 (C)	165	00011110000001	-4	3 (D)	165	11000000111100	-2
	166	000111100110000	-4		166	11000001100011	-2
	167	000111100011000	-4		167	11000001100110	-2
	168	000111100001100	-4		168	11000001110001	-2
	169	000111100000110	-4		169	11000001111000	-2
	170	000111100000011	-4		170	11000011000011	-2
	171	000110011100000	-4		171	11000011000110	-2
	172	00011001100001	-4		172	11000011001100	-2
	173	000110001110000	-4		173	11000011100001	-2
	174	00011000110001	-4		174	11000011110000	-2
	175	000110000111000	-4		175	11000110000011	-2
	176	00011000011001	-4		176	11000110000110	-2
	177	00011000001110	-4		177	11000110001100	-2
	178	00011000000111	-4		178	11000110011000	-2
	179	00011111100000	-2		179	11000111000001	-2
	180	00011111000001	-2		180	11000111100000	-2
3 (C)	181	00011110011000	-2		181	11001100000011	-2
	182	00011110001100	-2		182	11001100000110	-2
	183	00011110000110	-2		183	11001100001100	-2
	184	00011110000011	-2		184	11001100011000	-2
	185	00011100111000	-2		185	11001100110000	-2
	186	00011100110001	-2		186	11001100000001	-2
	187	00011100011100	-2		187	11000000011001	-4
	188	00011100011001	-2		188	11000000011100	-4
	189	00011100001110	-2		189	11000000110001	-4
	190	00011100000111	-2		190	11000000111000	-4
	191	00011001111000	-2		191	11000001100001	-4
	192	00011001110001	-2		192	11000001110000	-4
	193	00011001100110	-2		193	11000011000001	-4
	194	00011001100011	-2		194	11000011100000	-4
	195	00011000111100	-2		195	11000110000001	-4
	196	00011000110001	-2		196	11001100000001	-4
	197	00011000011001	-2		197	11000000011000	-6
	198	00011000011110	-2		198	11000000110000	-6
	199	00011000001111	-2		199	11000001100000	-6

Tableau 18 (CDS  $\leq 0$ )

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Classe	Données à 8 bits	Codes de modulation commençant par "0"	CDS	Classe	Données à 8 bits	Codes de modulation commençant par "1"	CDS
3 (c)	200	0001111110000	0	3 (d)	200	11100000001111	0
	201	00011111100001	0		201	11100000001110	0
	202	000111111001100	0		202	111000000110011	0
	203	000111111000110	0		203	111000000111001	0
	204	000111111000011	0		204	111000000111100	0
	205	0001111110011100	0		205	111000011100011	0
	206	0001111110011001	0		206	111000011001110	0
	207	0001111110001110	0		207	111000011100011	0
	208	0001111110000111	0		208	111000011110000	0
	209	0001111001111100	0		209	111000110000011	0
	210	000111100111001	0		210	111000110001110	0
	211	000111100110011	0		211	111000110011000	0
	212	000111100011110	0		212	111000111000001	0
	213	000111100001111	0		213	111000111100000	0
	214	000110011111100	0		214	111001100000011	0
	215	00011001111001	0		215	111001100001100	0
4 (c)	216	00011001110011	0		216	111001100011100	0
	217	00011001100111	0		217	111001100110000	0
	218	000110001111110	0		218	111001110000001	0
	219	00011000011111	0		219	111001111000000	0
	220	000011111110000	-2		220	11100000001110	-2
	221	00001111100001	-2		221	111000000011001	-2
	222	000011111001100	-2		222	111000000111100	-2
	223	000011111000110	-2		223	111000000110001	-2
	224	000011111000011	-2		224	111000000111000	-2
	225	000011100111100	-2		225	111000011000001	-2
	226	00001110011001	-2		226	111000011100000	-2
	227	000011100011110	-2		227	111000110000001	-2
	228	000011100001111	-2		228	111000111000000	-2
	229	000011001111100	-2		229	111001100000001	-2
	230	00001100111001	-2		230	111000000011100	-4
	231	00001100110011	-2		231	111000000110000	-4
5 (c)	232	000011000111110	-2	4 (d)	232	111000000110000	-4
	233	000011000011111	-2		233	111000011000000	-4
	234	000011111111000	0		234	111100000000111	0
	235	000011111110001	0		235	111100000001110	0
	236	000011111100110	0		236	111100000011001	0
	237	000011111100011	0		237	111100000011100	0
	238	000011111001110	0		238	111100000110001	0
	239	000011111000111	0		239	111100000111000	0
	240	000011100111110	0		240	111100011000001	0
	241	000011100011111	0		241	111100011100000	0
	242	000011001111110	0		242	111100110000001	0
	243	000011000111111	0		243	111100111000000	0
	244	000001111111000	-2		244	111100000000110	-2
	245	000001111100011	-2		245	111100000001100	-2
	246	000001110011110	-2		246	111100000011000	-2
	247	000001110001111	-2		247	111100000110000	-2
6 (c)	248	000001100011111	-2	5 (d)	248	111100011000000	-2
	249	000001111111100	0		249	111110000000011	0
	250	000001111110001	0		250	111110000000110	0
	251	000001111100110	0		251	111110000001100	0
	252	000001111100111	0		252	111110000110000	0
	253	000001110011111	0		253	111110001100000	0
	254	000001100111111	0		254	111110011000000	0
	255	000000111111110	0		255	111111000000001	0



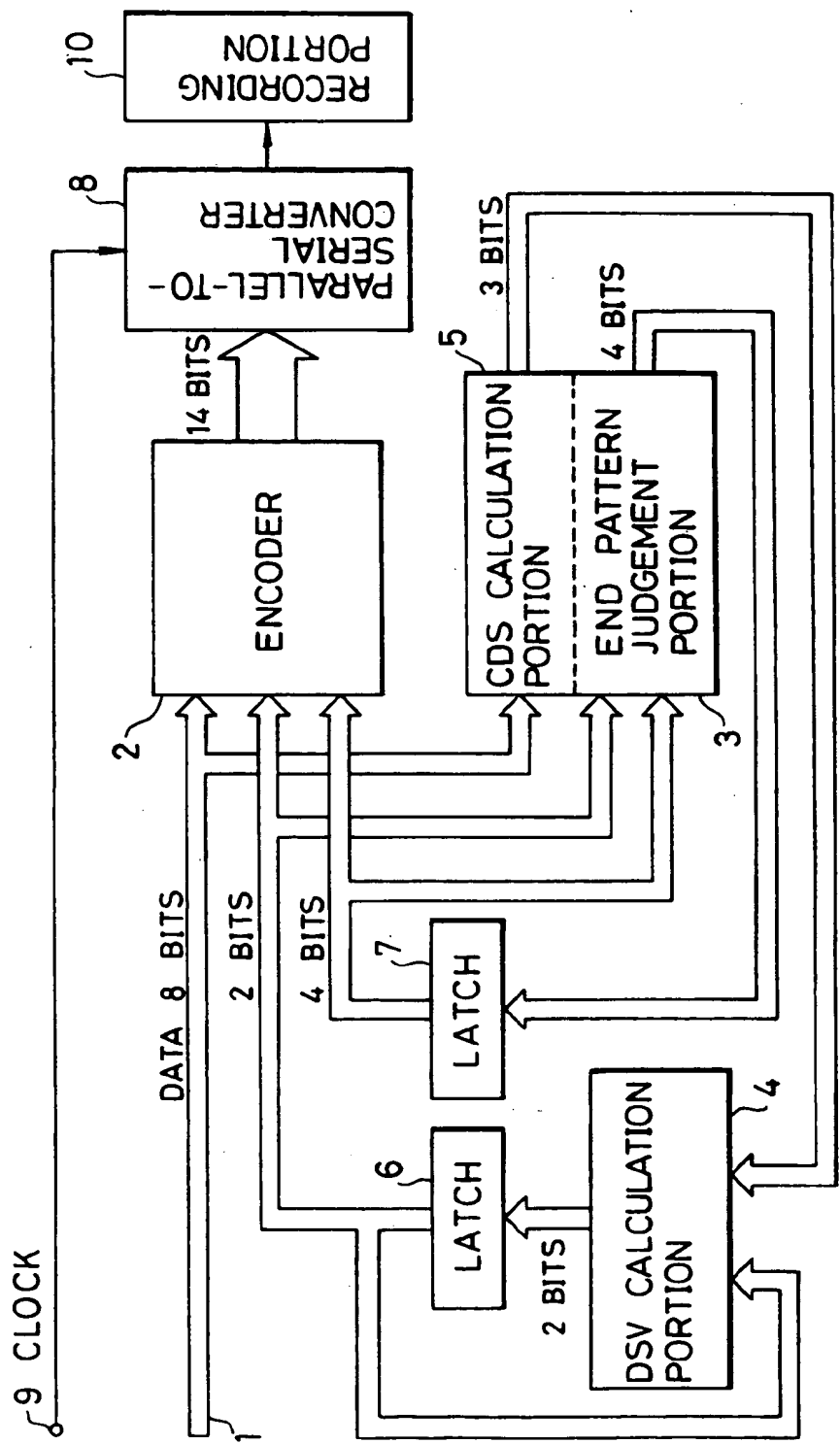


FIG. 1

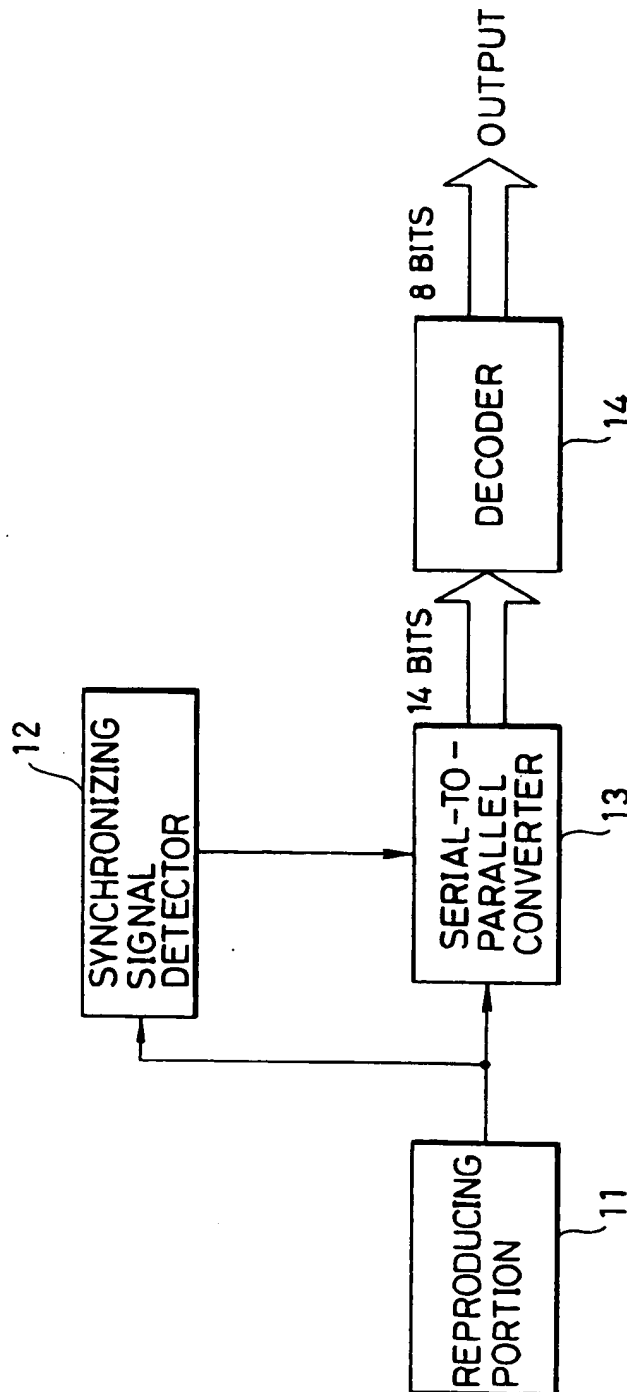


FIG. 2

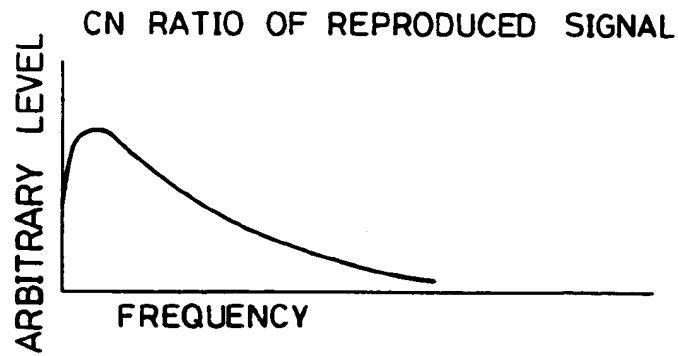


FIG.3A

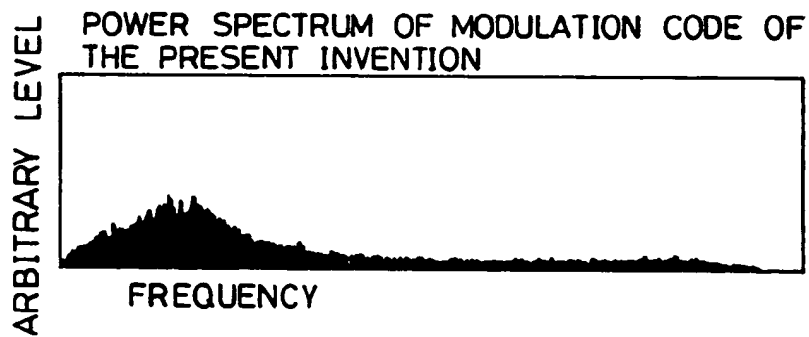


FIG.3B

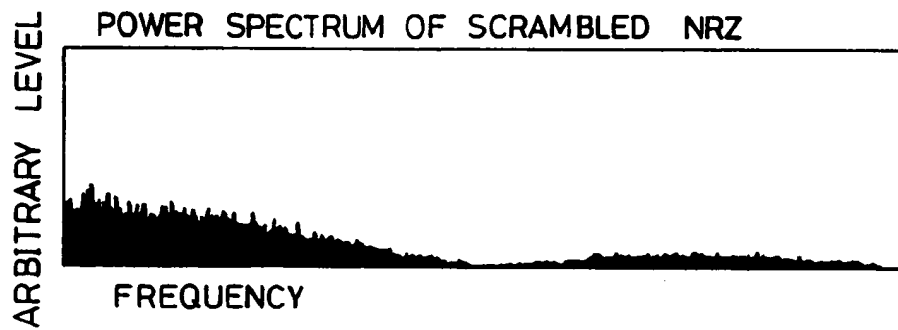
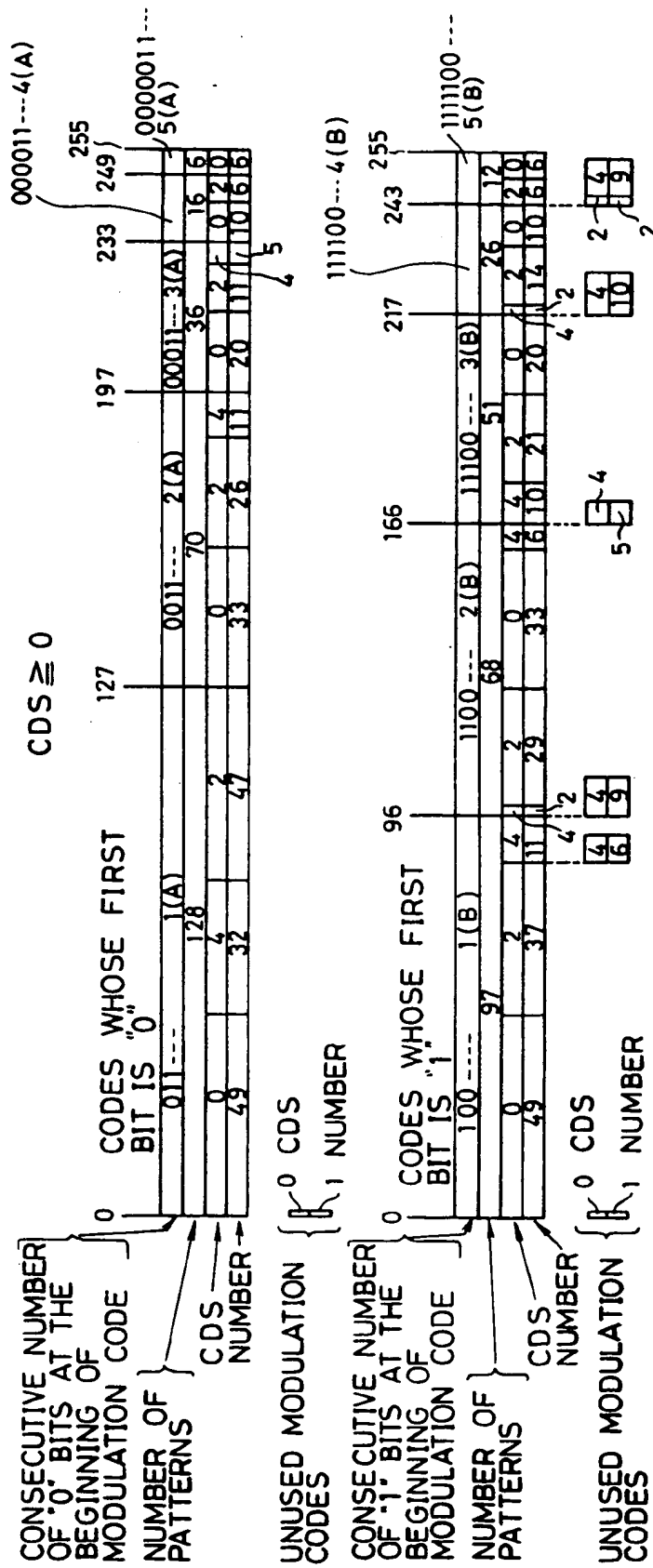
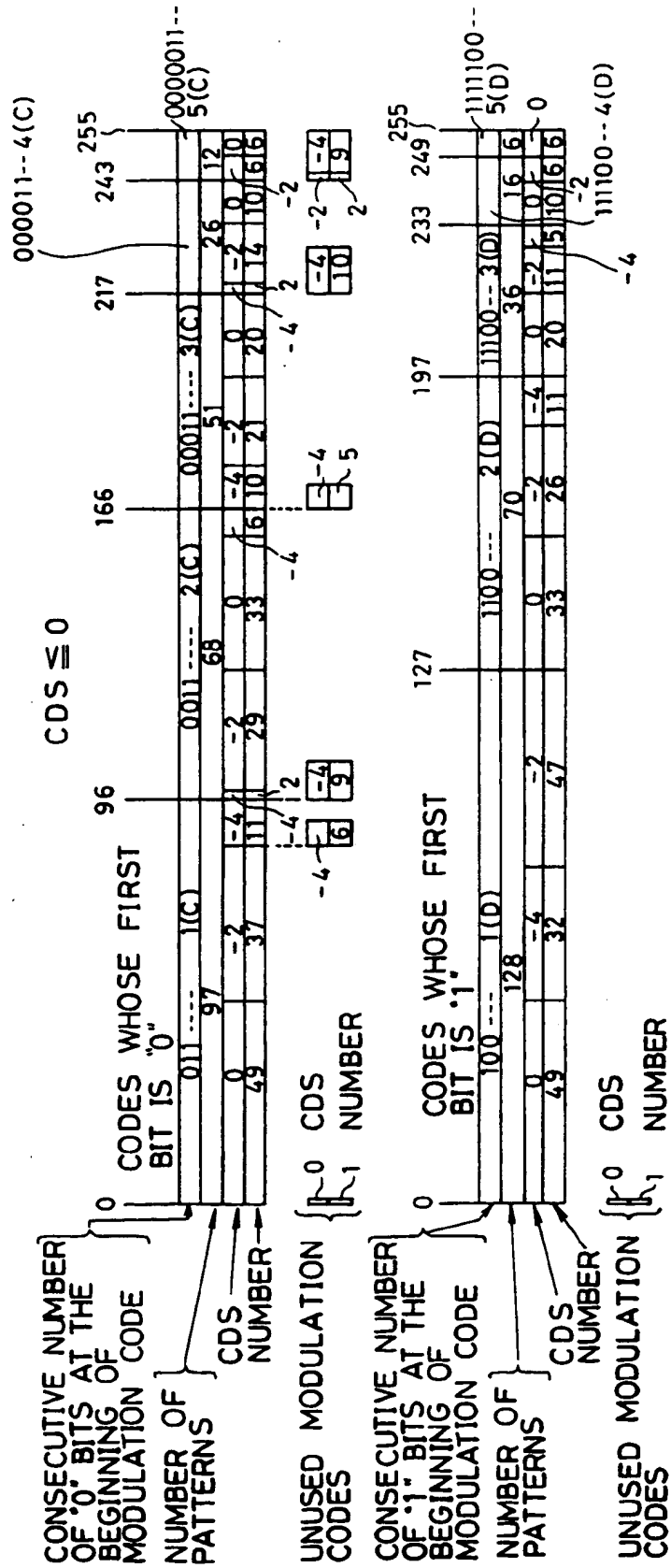


FIG.3C



**FIG. 4**



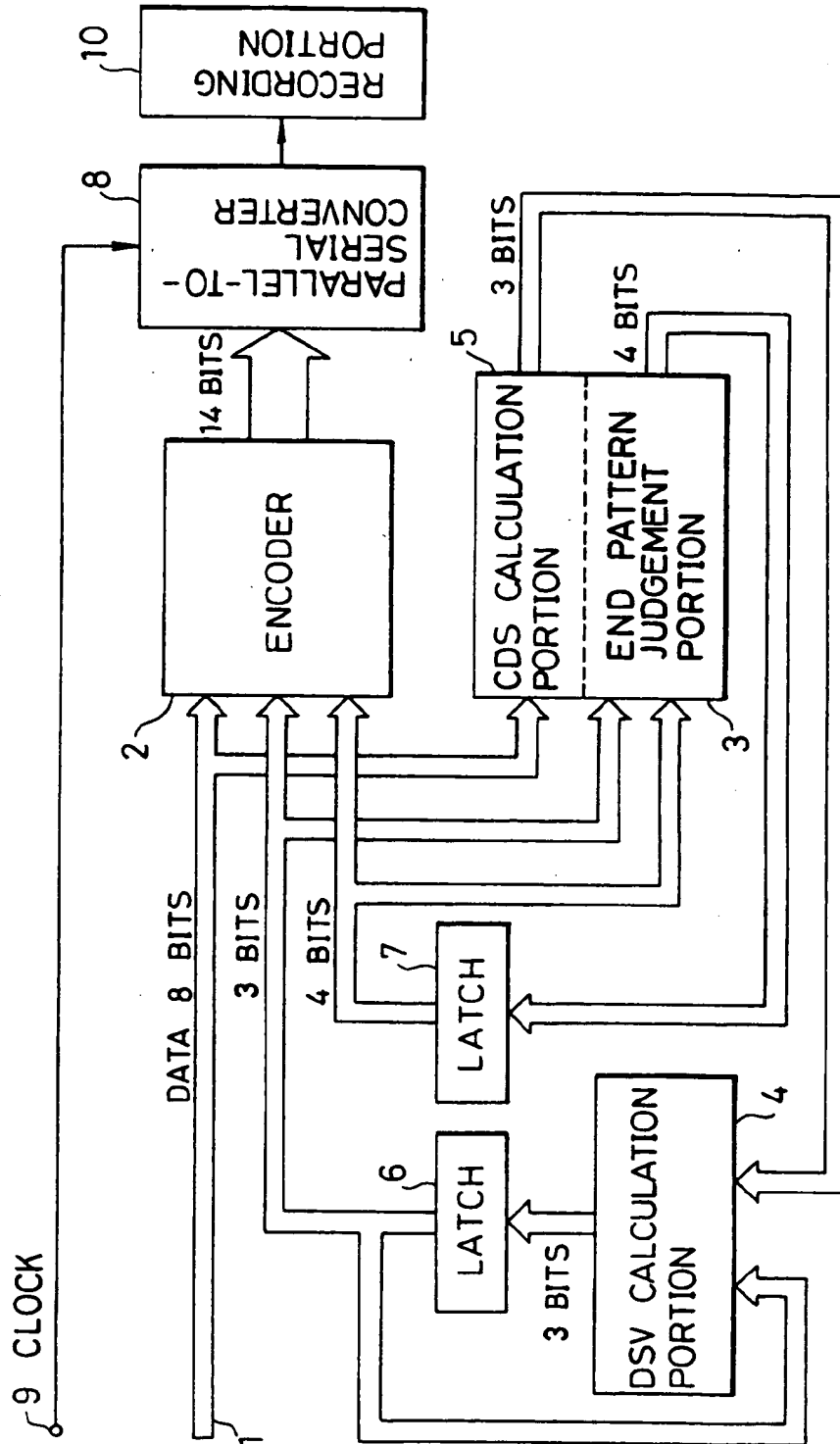


FIG. 6

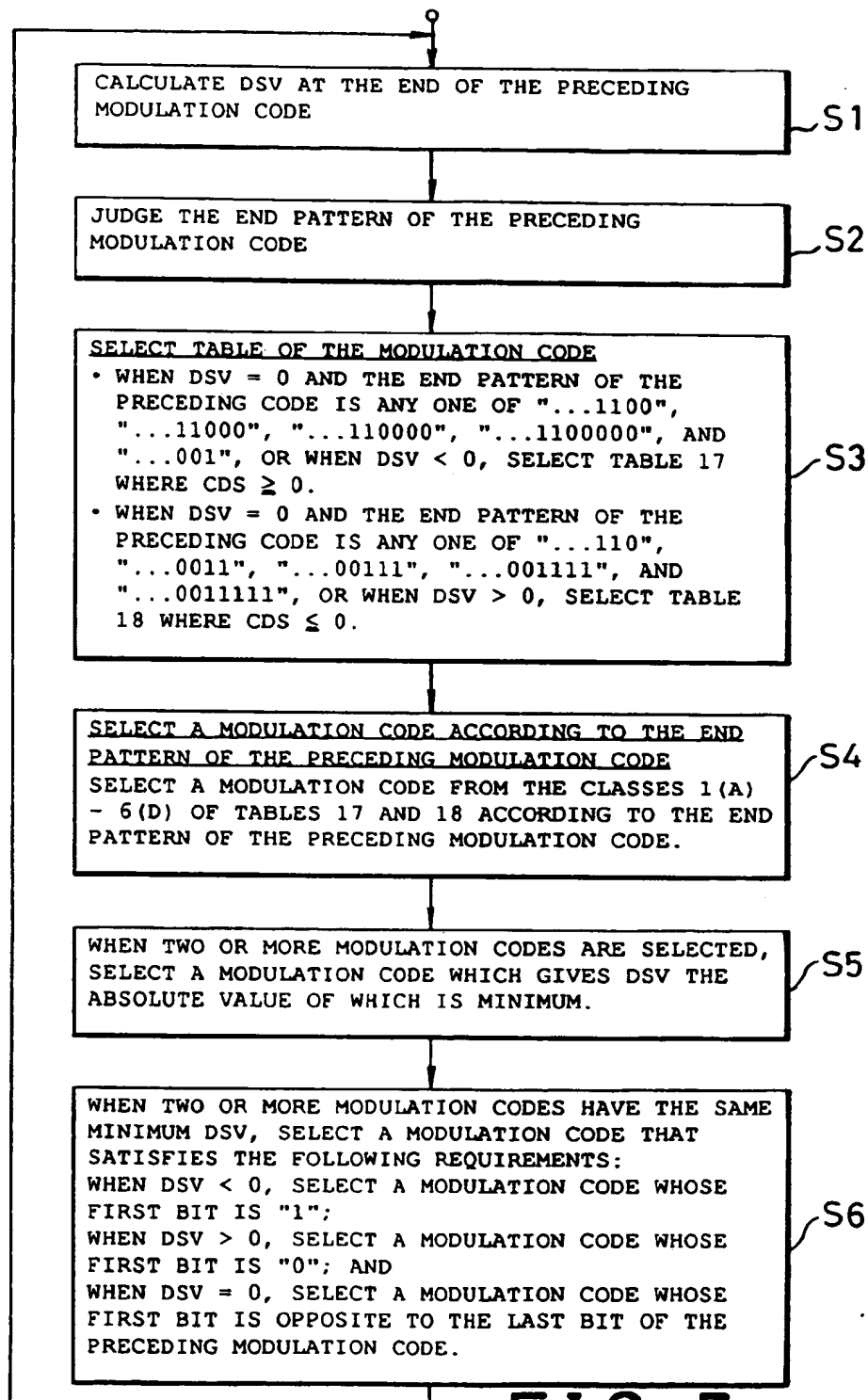
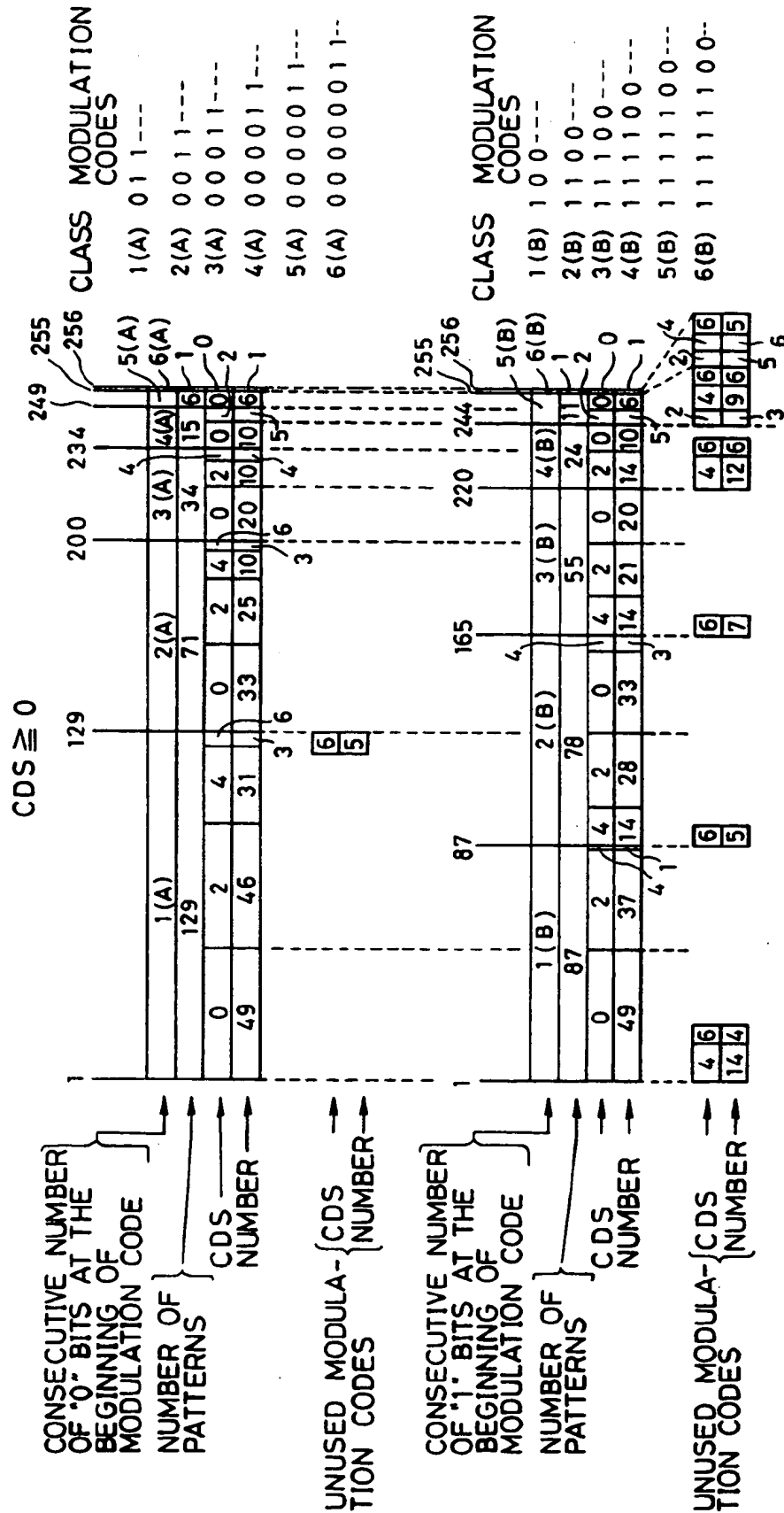


FIG. 7



**FIG. 8.**



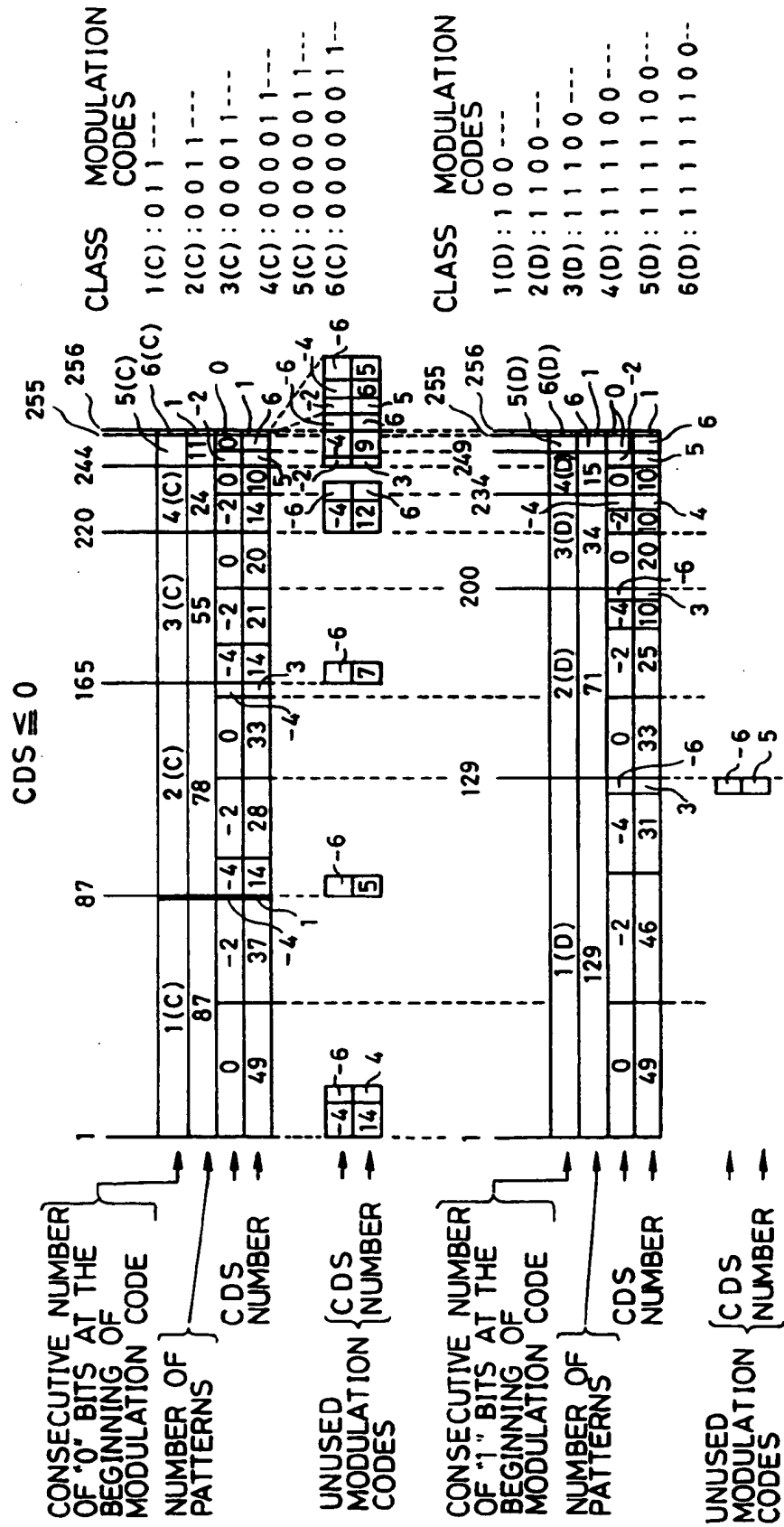


FIG. 9